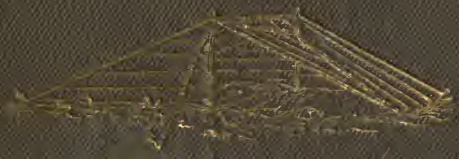
MOUNTAIN SCOUTING,



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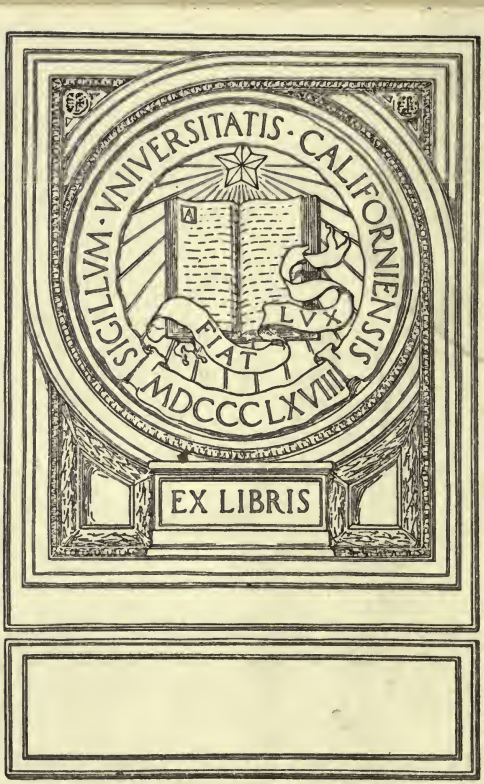
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Very truly Yours,

Edward L. Hamow.

U. S. Army.

MOUNTAIN SCOUTING

A HAND-BOOK FOR

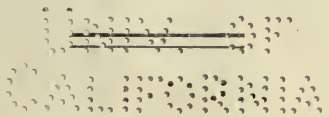
Officers and Soldiers on the Frontiers.

PROFUSELY ILLUSTRATED AND CONTAINING NUMEROUS NOTES ON THE ART OF TRAVEL,

BY

EDWARD S. FARROW, U. S. ARMY.

Assistant Instructor of Tactics at the U. S. Military Academy, and Formerly Commanding Indian Scouts in the Department of the Columbia.



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TO

OLIVER OTIS HOWARD,

Brigadier and Brevet Major General, U. S. Army

AS A TRIBUTE TO HIS

UNEQUALED ENTERPRISE AND PATRONAGE

OF THE ART OF WAR,

FROM HIS AFFECTIONATE FRIEND

THE AUTHOR.

M25521

PREFACE.

THE object of my book is to investigate that chain of many minor successes, each link of which must be perfect, in order to insure the success of any expedition.

A long and dangerous journey, without the loss of property, comfort, health or life, can only be accomplished after having learned how to prepare for all emergencies; how to avoid unnecessary hardships; and how to find out the capabilities of the country and of the party.

I make no claim to discoveries in mountain-craft, nor do I pretend to present any facts which have not occurred to others in similar situations.

I have endeavored to present, in small compass, such knowledge as the young officer often acquires by bitter experience and under the most unfavorable circumstances.

My book is not intended for officers who have seen service on the frontiers, many of whom are my competent teachers; but for the novice, who is so placed that he must depend upon himself in times of emergency.

To complete my work, I have drawn largely on the experiences of older officers and have introduced frequent notes recorded during the study of Indian character while in their peaceful villages, following their rugged trails, and in their hostile camps.

I have also freely consulted SCOTT'S MILITARY DICTIONARY, WALKER'S MANLY SPORTS and other works of reference.

I hope my readers will forward me any additions or corrections that may appear to them to add to the value of the work.

E. S. F.

WEST POINT, N. Y., December, 1881.

CONTENTS.

Chapter		Page
I.	The Horse.	9
II.	The Rifle.	25
III.	Medical and Surgical Hints.	41
IV.	Useful Information in Post and Field.	62
V.	Field Equipage and Supplies.	88
VI.	Mountain Travel.	100
VII.	Pack Mules and Packing.	111
VIII.	Marching.	130
IX.	Forced Marches.	141
X.	Crossing Rivers.	152
XI.	The Camp.	164
XII.	The Mess.	176
XIII.	Living off the Country.	194
XIV.	Indian Character.	213
XV.	The Trail, Signs and Signals.	228
XVI.	Skirmishing	239

APPENDIX.

I.	A System of Swimming.	3
II.	Rowing.	19
III.	The Chinook Vocabulary.	22

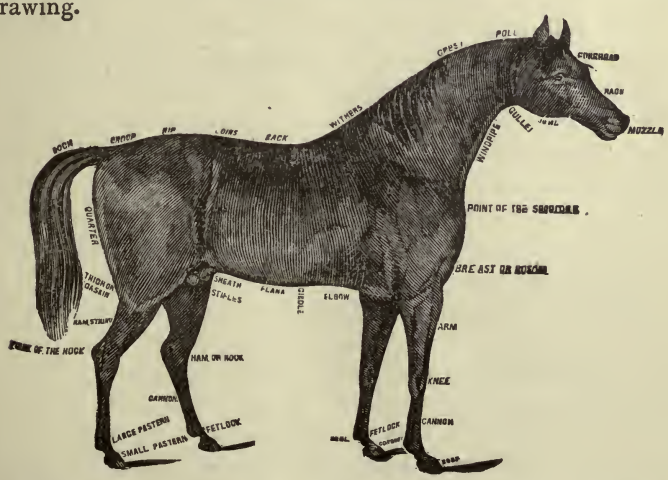
MOUNTAIN SCOUTING.

CHAPTER I.

THE HORSE.

A THOROUGH knowledge of the horse and his judicious treatment are essential to a successful mountain journey. If there be left any latitude in the selection of your horse, see that "he is not less than fourteen nor more than sixteen hands high; weighs not less than seven hundred and fifty, nor more than eleven hundred pounds; age not less than five, nor more than eight years; head and ears small; forehead broad; eyes large and prominent; shoulders long and sloping well back; fore legs straight and standing well under; chest broad and deep; barrel large, and increasing from girdle to flank; withers elevated; back short and straight; loins and haunches broad and muscular; hocks well bent and under the horse; pasterns slanting; and feet small and sound."

My idea of the perfect horse is depicted in the following drawing.



Range horses, or those that have been raised exclusively

on grass, are better suited for mountain service than those fed on grain. Hence it is that the square-built, large-trunked, short-legged Indian pony endures this service so much better than the American horse that has been accustomed to grain.

The Indian pony, generally believed to be the result of a cross between the Southern mustang and a small type of the Canadian, is never fed, stabled, combed, shod nor doctored; and when not under the saddle is left to shift for himself. In the winter he is a mere animated skeleton.

His proportions vary according to the localities in which he is found, but he seldom exceeds thirteen hands in height. He is wonderfully sagacious and sure-footed. He can climb a steep, rocky hill with assurance and activity, and rush down a precipitous declivity with much indifference. He will get over and through places, which appear utterly impracticable, with ease and rapidity, while the American horse would labor to travel at a walk. He particularly excels in the passage of swamps, marshy places and sands perforated with gopher holes.

When full mouthed, the horse will have forty teeth, twenty in each jaw. The mare possesses only thirty-six. The age of the horse may be determined by observing the teeth, the times at which they appear, are shed and replaced, and the alterations in their form and markings;—2 years, all milch teeth, which are easily distinguished from the permanent by being smaller, whiter and having necks;—3 years, two permanent teeth, central incisors;—4 years, four permanent teeth, central and lateral incisors;—5 years, all permanent teeth.

From this time on, the age of the horse is decided by the marks on the teeth;—6 years, the marks on the central incisors are worn out, and the points of the tushes are blunted;—7 years, the marks on the central and lateral incisors are worn out, those on the corner incisors still showing;—8 years, all the cavities are filled up. Beyond this age the criteria are uncertain.

The markings on the teeth (except those of crib-biters) are more distinct in the upper than in the lower jaw, and may be easily examined by the aid of a mirror.

The following facts are noted in connection with the horse's nature, management and capabilities :

1. He judges everything by seeing, smelling (feeling), and hearing.

2. He will resist no demand consistent with the laws of his nature, being unconscious of his strength.

3. He has a strong memory of places, and very readily finds again a trail or road which he has once before traveled.

4. He possesses the faculty of directing his course to the nearest water.

5. The absolute command of him can only be obtained by an admixture of kindness and firmness.

6. His lips and teeth adapt him to clipping short herbage—he can find an abundance where the ox would starve.

7. A good horse is ruined by the practice of passing a looped rope around the lower jaw, which is too often employed as an aid in keeping the seat when riding.

8. Avoid raising the arms when driving a horse. He is constantly in fear that they may fly off and strike him.

9. When he hangs back and will not lead, never get in front of him and pull, for there is no use, unless you are stronger than the horse. Place yourself opposite his shoulder and hold his head in front of you by grasping the bridle near the mouth, touching him with a whip held in the other hand.

10. Never whip a horse to hurt him. When he is stubborn, apply the whip lightly about his legs and flanks, and not on his back.

11. When a horse will not stand, and is addicted to the habit of kicking, tie up one of his fore legs and leave him on three. He can then neither run away nor kick, and will soon learn that you do not intend to hurt him. If not pressed, he can hop two or three miles on three legs. Two miles of hopping is a sure cure for a kicker or a jibber.

12. To overcome the stubbornness of a horse that has thrown himself down, do not flog him. Twisting or biting his tail is the usual way to manage him. A tuft of grass set ablaze and placed under his nostril will cause him to rise.

13. It is not well to use a whip on the horse from which you shoot; if so, when you raise the gun to fire he is sure to be unsteady, feeling a dread of its being the whip.

14. A load on a horse's back is the worst application of his strength; he can draw about seven times as much as he can carry.

15. An average horse equals six men at a pull, and requires about five gallons of water daily.

16. Experiment has shown the following endurance of horses:—A healthy horse will live on water alone twenty-one days; he will live without eating or drinking about fifteen days; he will live if fed, and without water, for about six days. The average length of life of the horse in all localities and under all circumstances is about twenty-one years.

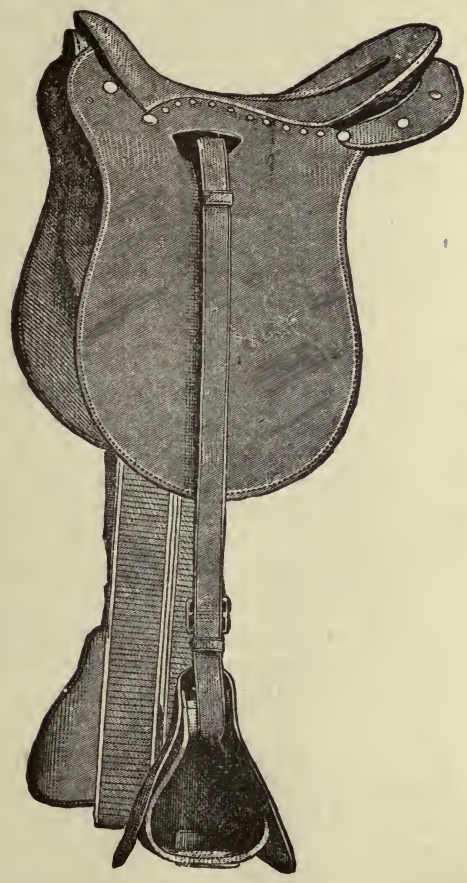
Before starting on a long journey, on horseback, every effort should be made to secure a proper equipment.

In selecting a saddle, see that it is light, strong and large enough to permit the weight to be evenly distributed over the horse's back. It should be sufficiently raised to admit a free circulation between it and the spine, while the pommel is high enough to prevent the rider from being thrown forward.

The cynch should be made of some soft and elastic material, such as hair, and not less than four inches in width.

I have ridden on a hunting saddle, shown in the drawing on the page opposite, very much on the order of the present military saddles, but so constructed as to better fit the horse, and less liable to produce a 'sore back.' This saddle seems well adapted to use in a wild country. It may be supplied with rings and 'D's' at pleasure. The stirrup iron is of large size, so as to admit the free passage, in and out, of the boot with mud or clay about it. It is also heavy, and the

foot can readily find it should it be lost for a moment when the horse is in rapid motion.



The saddle-blanket should be folded smoothly and evenly and cover all the back touched by the saddle. A piece of linen cloth placed under the blanket will often prevent sore back.

If a horse is sweating very much when unsaddled, it is well to allow the saddle-blanket to remain strapped upon his back until he is dry. Cold water should never be applied to the back while heated—it is all right to wash it after it cools, but not before.

The bridle should fit the horse comfortably and there should be room for the finger between the chin and the curb-chain. If the horse be tender-chinned, the chain should be covered with leather.

The bit should be sufficiently light and easy not to fret or chafe the horse. Many bits are instruments of torture and the horse will often set his jaws against them to alleviate the pain.

An excellent bridle is one so constructed that the bit may be removed by unbuckling, thus converting it into a halter for leading or picketing, and at the same time admitting of the use of any bit.

The bit cannot be too carefully adjusted. If the horse open his mouth, writhe his jaws and throw out his tongue—if he have no appuy, violently toss his head up and down, carry it low or refuse to go forward, the bit needs a proper and immediate adjustment.

The spur should be used by accomplished riders only, and then with great prudence and thorough knowledge of the horse. It is often advantageously replaced by a light switch or Indian whip.

The first two essentials for good horsemanship are a firm seat and a light hand.

To mount safely and easily, stand at the left shoulder of the horse, looking to the rear ; take the reins in the right hand, dividing them by the middle finger of the left hand until the horse's mouth is felt ; close the left hand, about ten inches in front of the saddle, firmly on the mane and reins, and throw the loop to the off side, with the right hand ; place the left foot into the stirrup, the right hand assisting after quitting the mane ; then using the mane as a slight hold, raise the body

into the air, passing the right leg over the horse, assisting in this by taking hold of the back of the saddle and steadying the fall of the body by placing the right hand on the pommel.

Dismounting may be accomplished by a reverse process.

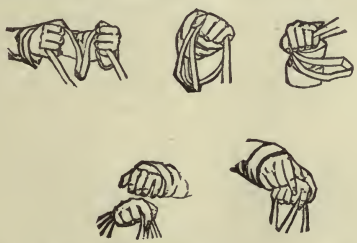
In dismounting on rough and dangerous trails, to avoid accident, it is better to disengage both feet from the stirrups at once and vault from the saddle to the ground.

Having gained the saddle, the rider should seat himself so as to place every part of the body in such position that it can act upon the horse in every emergency.

The proper length of stirrup is when the tread of the stirrup is about one-half inch below the inner ankle-bone—and when the feet are in the stirrups, the heels should be two or three inches lower than the toes.

The grip in riding should be maintained by the thigh and knee, and not by the knee and calf only. The positions of the feet and hands exercise some influence on the security of the seat; and without the acquisition of a firm seat, the acquirement of good hands is impossible.

The rein-hold varies with the design of the rider and the propensities of the horse. The drawings show the usual methods of holding and shifting the reins.



In holding them separately, one passes into each hand, between the third and fourth fingers, and out over the fore-finger, where it is held down by the thumb.

Frequently the reins are held in the left hand, as when first taken up. Here, the left rein passes under the little finger, and

the right under the third, both passing through the hand, and the superfluous rein hanging over the first joint of the fore-finger, the thumb securing it.

Sometimes, the right rein enters the hand over the fore-finger from above and crosses the left rein in the palm, where the fingers close upon them. The loop, formed of the residue, hangs down between the hand and body.

The reins must be shifted expertly without breaking the time or altering the pace.

To shift them from the left hand :—Turn the thumbs toward each other and carry the right hand over the left; place the fore-finger of the right hand downward, in the place of the little finger of the left hand, between the reins; and pass the reins through the right hand, placing the thumb upon the left rein, near the second joint of the fore-finger.

To return them to the left hand :—Carry the left hand over the right and place the little finger of the left hand downward between the reins; then carry them smoothly upward through the hand, and let the ends hang over the fore-finger.

Quickness, firmness, gentleness and lightness are essentially necessary to good hands.

The necessity for readiness in the rider's hand is obvious in both the standing and flying leaps. Without it, the horse will be embarrassed and both the animal and his rider endangered.

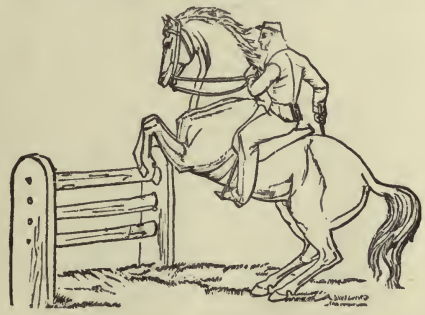
While the rider quickly and fearlessly gives the horse his

head, he must preserve his own equilibrium, by leaning forward as the horse rises, and backward as he alights.

In the leap, the rider should not raise his body upright, nor slacken the hold with his legs, before the hind feet of the horse come to the ground. The horse requires no support or assistance from the hand until he is coming to the ground.

I have stated that, in theory, the rider should lean forward during the time in which the horse is on his hind legs ; but, in practice, this position is so momentary, and the spring from the hind legs is so powerful, that it is dangerous to lean forward at all, and would be difficult, if not impossible, to get back in time to render the horse the assistance he needs when his feet touch the ground.

The drawing shows the theoretical position of the rider, and



the danger of the same is apparent, should the horse not go fair, or refuse to take his leap.

The hand and leg should at all times work together in guiding the horse—the hand will retain the head and neck in proper position, while the leg will communicate the forward impulse.

It should also be remembered that the strongest part of the horse and the center of action is a little in rear of his shoulder-blades ; hence, riding rather forward in the saddle is a relief to the horse, while leaning back and bearing upon his loins—his weakest part—cause much fatigue.

In all critical situations, with a horse addicted to bolting, rearing, kicking, etc., the seat should be maintained as in leaps.

If the horse runs away do not devote your strength to vain pulling, but guide him out of danger and let him run until he is tired. For a bolting horse a Bucephalus nose-band is very useful.

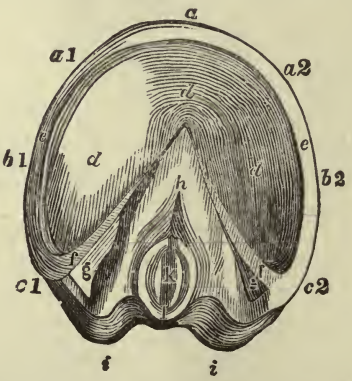
If he rears give him his head and lean forward.

If he kicks, sit firmly in the saddle and keep his head up.

Before mounting any horse, the rider should ascertain whether the saddle and every article of equipment are good and well fixed.

The shoes on a horse's feet have much to do with the comfort of both his rider and himself. Many horses are rendered absolutely unserviceable by improper shoeing.

It should be one of the first duties of those having the management of horses to study the nature and structure of the horse's foot and the best manner of keeping it shod.



The drawing represents the ground surface of the hoof prepared for the shoe : a, a 1, a 2, show the front, inner and outer toe ; b 1, b 2, show the inner and outer quarter ; c 1, c 2, show the inner and outer heel ; d, d, d, show the sole ; e, e, show the crust or wall of the hoof ; f, f, show the bars ; g, g, show the

commissures ; h, k, l, show the frog (h being immediately under the navicular joint) ; i, i, show the bulbs of the heels.

If the following simple suggestions be followed, the horse will carry his rider over rough roads and will not be in pain while traveling.

Remove the old shoes, one at a time (withdrawing the clenches), rasp the edge of the hoof all around and remove any stubs that may be left in the crust.

Pare out the foot, without cutting the sides of the bars, shaving the frog, or opening the heels. Neither heel nor frog should be pared more than is necessary to remove what is ragged, for no reproduction occurs here as in the case of the hoof.

If the horse has a low heel, the foot should be pared at the toe only. Under no circumstances should the fore part of the hoof be allowed to grow long ; if so, it is sure to throw the horse very much on his heels, making them tender and causing lameness, and also to strain the ligaments of the fetlock joints.

Do not select a shoe that is too light. A light shoe is apt to bend long before it is worn out, and the consequent pain is injurious to the horse. As a rule, select the short shoes for the horses having short pasterns.

The 'seating' should be carefully looked after at all times.

The nail-holes should be stamped so as to pass straight through the shoe, and come out in the flat of the web.

In this way the nail will come out low down in the thickest part of the hoof, and give a strong clench (made out of the shank of the nail), thus securing a firmer hold for the shoe, without pricking the foot.

The soundness of the foot is greatly influenced by the number of nails, and where they are placed. To prevent unsoundness, the nails should be so placed as to allow the foot to expand. The inner quarter and the heel of the hoof expand the most, and should be left free from nails.

Pressure on the heels may be prevented by driving the nails, toward the toe, a little tighter than the heel nails.

For a fore shoe, five nails are a sufficiency ; three on the outside and two on the inside. For rough roads, four on the outside might be advisable, but never more.

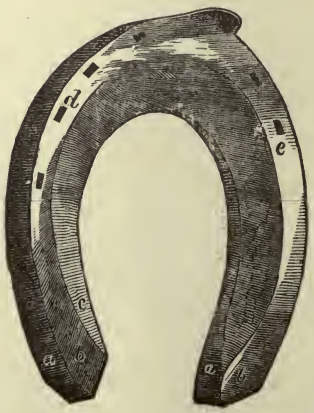
A 'clip' should be turned up at the toe to keep the shoe steady and prevent its being forced back ; but one should never appear at the side of the shoe, as it interferes with the expansion of the hoofs.

A new shoe, turned up at the toe, feels to the horse like an old shoe and insures better traveling.

Be careful to have the shoe fitted to the foot, and not the foot to the shoe, as is too often done.

The shoe should not project beyond the hoof at the sides and in rear. Many shoes are lost through this fault ; moreover, the projections will check the sinking of the pastern bone, and cause the horse to step short.

To properly fit the shoe, it should be made hot enough to scorch the hoof all around—a hot shoe does not injure the hoof.



The drawing shows an excellent form of front shoe and the position of nail-holes ; a, a, show the heels, same thickness as the rest of the shoe ; b, b, show the points at which the heels

of hoof terminate ; c, c, show the seating ; d, e, show the position of nail-holes.

After nailing on the shoe the clenches should not be trimmed by rasping. The rasp should never be used above the clenches, as it tears off the outer covering of the hoof—thus leaving the horn exposed to the air, when it soon becomes dry and brittle and breaks off.

The functions of the hoof's covering are the same as those of the finger-nail.

On a well formed foot, the horny crust is about one-half inch thick at the edge and the angle formed by the front of the foot and the horizontal surface should be fifty degrees.

In consequence of the weight of a horse falling differently on the hind feet, certain strains of the hock and back sinews should be guarded against by raising the heels of the shoe. The hind-foot expands less than the fore-foot, and the inside quarter and heel should be left free to expand.

The holes on the inside should be closer together than those on the outside, and should be placed forward toward the toe. Three nails on each side is sufficient to firmly hold the hind shoe. A small hind-foot may be shod with three nails on the outside and two on the inside.

The largest foot should never have more than seven nails.

The shoes should be removed, placed in the fire, and refitted or replaced by new ones once a month.

Tender-footed horses travel better when the sole has a leather, gutta-percha or water-proof felt covering.

Indian ponies, having very tough and elastic hoofs, can make long journeys without being shod ; but if this is permitted, the hoof soon wears so smooth that it is difficult for them to walk on grass or rocks.

Horses that brush and kick should be furnished special shoes.

In case of lameness, remove the shoe and carefully examine the foot yourself. It avails nothing to direct a farrier to examine a foot that he himself has shod.

In order that horses may stand up well they should be supplied with nutritious forage.

Oats contain about three-fourths their weight of nutritious matter. When good, they should be dry, sweet, heavy and rattle like shot. They are most preferable when about one year old. New oats are difficult to grind down, and often occasion colic and staggers. All such, or those that are wet and musty, should be kiln-dried before feeding. Oats possess an invigorating principle not found in any other grain. Oat meal in the form of gruel constitutes one of the most satisfactory articles of food for the sick and tired horse.

Barley contains about nine-tenths its weight of nutritious matter, but is not so good as oats as an article of food. Horses fed upon it, are subject to mange, surfeit, and inflammatory complaints. Barley straw induces diseases of the skin.

Hay should be one year old, if procurable, when fed. New hay acts as a purgative. Old hay becomes dry, tasteless, innutritive, and often mow-burnt, in which condition it becomes really poisonous. Horses fed on such soon become languid, hide-bound, worthless, and often victims of diabetes. Hay must not be fed in too large quantities. Many diseases of the horse are the results of over-feeding with hay. Horses are prone to eat more than they should, hence it is necessary to add grain containing more nutriment in a smaller compass.

Wheat contains more nutritious matter than barley and more gluten than any other grain. It should be fed in small quantities, or colic and fomentation will result. It is difficult of digestion, and the horse fed on it should have but little hay and water soon afterwards.

Peas and beans, in small quantities and about one year old, are excellent articles of food for horses. They should be well crushed before feeding and generally fed with hay. If fed alone, they might produce the megrims or staggers.

Carrots, when sliced and mixed with grain, make a splendid provender for the horse, and are found to be very beneficial in

all breathing and skin disorders, coughs and broken wind. They should be fed in small quantities, as they are slightly laxative and diuretic at first.

Potatoes possess great virtue as an article of horse food. If they are slightly steamed before feeding, horses will prefer them to oats. If they are mixed with other provender, there is a great saving in expense and an increased capability for work. One acre of potatoes is equivalent to four acres of hay.

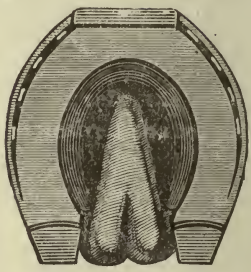
I was first convinced in 1879 that potatoes (even raw) constituted a most valuable article of food for horses. I had made a long journey, following the trail of a few marauding Indians, over very barren and rocky mountains. After traveling three days without any grass or substantial food for the horses, I camped on the south fork of the Salmon river. Near my camp were the remains of a ranch to the extent of a small potato patch. The Indians had murdered the owners and set fire to the grass and buildings a few days before. I ordered the herd to be turned into the potato patch, thinking that the green potato tops would be better than nothing for them to eat. It was not long before the mules were discovered rooting up the ground, like so many hogs, and eagerly devouring the raw potatoes. The horses followed suit. The next day the march was a long one of twenty-five miles, over a high and exceedingly difficult mountain; but, notwithstanding, every animal went into camp with a light and elastic step, holding his head high.

If the horse can be supplied a reasonably fair amount of nutritious forage, and his feet be kept in proper condition, he is not likely to become unserviceable in the field.

In mountainous countries some means should be contrived to prevent horses from 'balling' and slipping in winter and from picking up stones in summer. The 'Wheeler Anti-Snow Ball Pad and Hoof Protector' is the best preventive for these troubles that I ever used.

The drawings show the form of this pad and the manner of

FORM OF PAD.



ADJUSTED PAD.

adjusting it. It is made in sizes to fit any foot, and is fitted without removing the shoe. It is made of vulcanized rubber into which a brass spring with catches is molded. Neither straps nor nails are required. When properly sprung into position (the frog uncovered) it cannot be thrown out by the strongest actioned horse.

CHAPTER II.

The Rifle.

While drills, dress parades and guard-mountings make up the rudiments of a soldier's education, the rifle and rifle practice should form the subjects of the first and most important chapter.

I will not here go into the details of this interesting study, but will confine my remarks to some of the errors and inaccuracies of fire, susceptible of practical correction, chief among which is that resulting from the miserable sights forced upon the service rifle.

When firing in vacuo, the trajectory is easily traced and its properties simply discussed. Considering its position with reference to the line of sight it will be seen that near the muzzle it is below the line of sight for some distance, then it cuts it ; beyond this point it rises above the line of sight for some distance, then falls and cuts it again. This second point of intersection is the point blank and determines the point blank range. With a good rifle, up to 175 or even 200 yards, the line of fire will not cut the line of sight ; or, in other words, it will not shoot high.

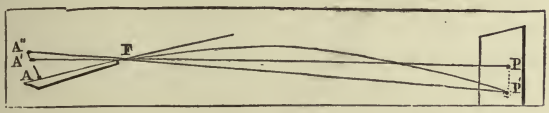
In my practice with a 50 calibre Remington in a still and light atmosphere, this point was found to be at an average distance of 183 feet from the muzzle. Now, inasmuch as it is necessary, in order to hit an object within or beyond the point blank, to aim below or above it certain distances, it is readily seen how indispensable are the contrivances (sights) which will so alter the point blank as to make it coincide with any object directly aimed at. The range in vacuo equals $\frac{2xy}{g}$ in which x and y are the horizontal and vertical components of the im-

pulsive force, and g the acceleration due to the force of gravity. From this we see that (velocity being constant) the range will be the same when the angles of fire are equally distant from 45° ; thus, angles of fire 36° and 54° will give the same range. It is also seen that the range will be a maximum when xy is a maximum, or when $x=y$, or when the angle of fire is 45°. Also, that when the angle of fire is 45°, the height of the culminating point of the trajectory is equal to one-fourth the range and is a maximum—that it is o when the angle of fire is o or 90°. These simple laws of motion of a projectile in vacuo are greatly modified when the movement is through air. For instance, in air the maximum range with our service rifle is attained with an elevation of about 30°, (while it is 45° in vacuo).

The progressive velocity of fall of the bullet being so much less than its initial velocity, the air resistance opposed to its descent will be inappreciably small in comparison with that in the direction of its motion of translation (the resistances being proportional to the squares of the velocities). Hence, when the bullet would have been at certain points, in vacuo, it will in reality be at points below and in rear of them, by distances increasing from the point of departure (since the resistance of air causes the spaces passed over in equal times to become progressively smaller and smaller), thus causing the trajectory in air to be constantly below and in rear of its place in vacuo and changing its curvature, so that the left branch presents a flattened form while the right branch approaches the vertical. From thus destroying the symmetry of this curve, there results that the angle of fall is greater than the angle of ascent, and more considerably so as it is distant from the origin, that the point of culmination is lowered, and that the range is greatly diminished.

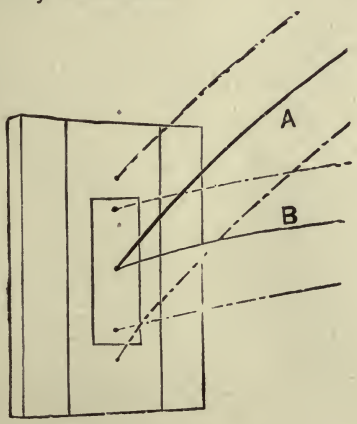
In practice the object aimed at has a certain height ; hence, it will not only be struck when at point blank, but also when at points in rear or in front of the point blank where the vertical

distances of the trajectory from such points shall be equal to or less than the height of the object. This distance between these two points, known as the dangerous space, is greater as the trajectory is flattened or as the height of the object is greater.



The illustration represents an object, P P′, in advance of the point blank, which is struck at P′. If it were at point blank, it would be struck at P. An object may also be struck when in rear of the point blank. The sum of the distances in front and rear of the point blank, at which the object could be struck at its bottom and top, is the *dangerous space.* This permits us to make slight errors in estimating distances; we can either over or underestimate them so long as the errors do not exceed the limits of the *dangerous space.* (For dangerous spaces of the service rifle and carbine see Chapter IV.)

I think I am echoing the opinions of our best sportsmen when I say that the Remington rifles are far in advance of others in the attempt to increase the dangerous space, and hence the accuracy of the arm.



The diagram shows how, with an equal divergence of the bullets in both cases, those having flat trajectories hit the target, while the two having highly curved trajectories miss it, the one striking above and the other below it.

In hunting, or when firing at an enemy over an unknown distance, the importance of a flat trajectory is evident—but it is still important even where the distance is definitely known.

When firing at long range a delicate estimation of distance is necessary to obtain accuracy of fire, even when using the best and most accurately graduated sights. Any ordinary man can be drilled to estimate distances up to 600 yards with great accuracy and dispatch. Distances may be appreciated by the eye alone or by the aid of instruments. The latter method is of no practical value in the field before an enemy, and should only be employed on the drill ground as an aid where time is an important element.

The *tige* and *stadia* are worthless, and should not be noticed.

The *stadiometer* is but little superior. The form described by General Wingate is the best.

The writer's stadiometer, the principle of which is based on the proportionality of the corresponding sides of similar triangles and an application of the plummets, does good work on an undulating and broken drill ground, where actual chain measurement would be impracticable if not impossible. Prolonged practice and experience in the appreciation of distances are necessary to give the *coup d'œil* that insures sufficient accuracy. The practice should be conducted over smooth, broken and undulating ground, and frequently from elevated points. The distances should also be estimated in all directions as regards light and the condition of the atmosphere.

The following are the important causes which vary the direction and intensity of the forces acting on the bullet, and which may be greatly obviated by carefulness and an understanding of the subject:

1. A frequent cause of inaccuracy of fire is a false or defect-

ive barrel, short swells and long depressions being often found on its interior. These swells or ridges, by increasing the friction, may so affect the recoil as to have an injurious effect on the fire, or so affect the exterior form of the bullet as to produce an irregularity in its motion. The depressions or swells change the interior lines of the piece and give the bullet a false direction.

2. Another cause of inaccuracy of fire is the vibration of the barrel when firing, caused by the want of a homogeneous distribution of metal about its axis, and often to binding bands. These vibrations tend to alter the direction of the bullet as it leaves the muzzle.

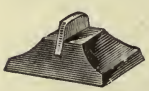
3. Recoil causes the man to turn to the side from which he fires, and produces deviation in that direction. It is supported by pressing the butt firmly against the shoulder with the right hand, the left hand supporting the weight of the rifle, and varies with the position of the rifle relative to the horizontal, being a maximum when the shot is fired vertically upward. The shock of the recoil against the shoulder is diminished by the bend in the stock, serving to decompose the force into two components, one acting through the stock against the shoulder, the other in. the direction of the axis of the barrel, tending to raise it. Whatever lessens the recoil theoretically increases the range The recoil is only 95 lbs. for the Remington rifle (70 grains powder and bullet of 450 grains), while in our service rifle, caliber .45, it is 174 lbs.

4. When the bullet reaches the muzzle of the rifle, it will revolve about its axis nearly 800 times in a second, and a point on its exterior side surface will have an axial velocity of about ninety feet per second. This in connection with the resistance of the air produces a lateral drifting of the bullet in the direction in which the grooves have a turn. This is known as *drift*, and is greater in the descending than in the ascending branch of the trajectory. It increases as the diameter of the bullet, the angle of fire, the velocity of rotation and the range

increase, and as the velocity of translation decreases. The drift in our service rifle (caliber .45, seventy grains powder) at 500 yards is two feet.

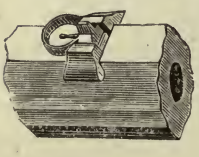
5. The pull of the trigger should not be too great, a three-pound pull being the minimum. It should be pressed by a steadily increasing pressure of the finger in the direction of the axis of the barrel, without communicating motion to the rifle, the breath being held until the hammer falls. If the trigger is too hard and is pulled convulsively, the muzzle will be turned to the right. There should be a quick and decided connection between the mind and finger. Few men can pull off the trigger of our average service rifle with the first joint of a single finger. I have frequently supported the whole weight of the rifle, at full cock, on the trigger, without pulling it off, and I consider this a very serious defect. Every man should invariably fire his own and the same gun, in order to become acquainted with its defects of construction, and learn how to make allowances for consequent deviations from the theoretical trajectory.

6. The principal cause of the inaccuracy of fire of our service rifle is that it is sighted too coarsely. Without apparent movement, this rifle may be sighted on any object within a horizontal radius of many feet. It seems that very little attention has been paid to this most important part of the rifle's construction. If our rifle is to be furnished with the rough,



and too frequently misplaced, plain bead foresight and open rear-sight, we certainly have no right to look for good shots in the Army. I think it would be well to follow the Remington system in this matter.

Replace the present bead sight by the 'Beach Combination



Sight,' which is such that it forms either an open bead or a globe sight with cover, according as the leaf is turned up or down, thus adapting it either to hunting or target use (and if I mistake not our frontier field

service is more on the order of hunting than range practice). The globe of this sight is so constructed as to permit the use of all descriptions of sights, detachable pieces of the various forms in use being slipped into a slot in the globe and held by a screw

The four sights represented seem to be favorites with the best long-range shots.

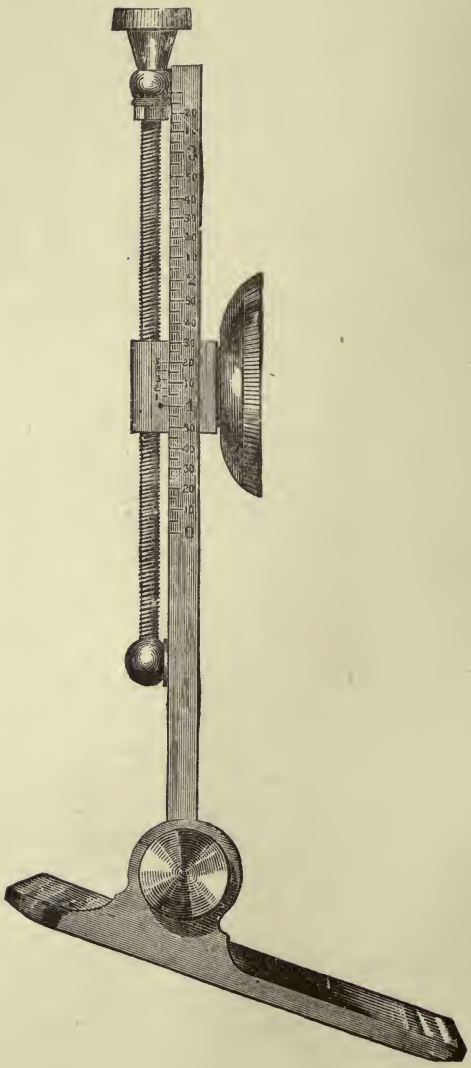
A spirit-level and wind gauge adjustment may be attached to this sight, and insure any degree of nicety.

Then replace the open rear-sight by such a sight as is found on the Remington-Creedmore rifle and represented on the following page—one provided with a vernier scale operated by a screw that will accurately mark an alteration of less than the one-hundredth of an inch in the elevation, each minute of elevation on the scale corresponding to about one inch for each 100 yards of range,—and we will have a system of sights in keeping with our rifle and the efficiency of the arm will be assured. There is nothing objectionable in such sights, and their adjustment is extremely simple. To adjust the rear sight, the eye-piece is first loosened, then after the sight is properly set by means of the screw, the eye-piece is tightened and holds the slide firmly, irrespective of the screw, which is intended only for convenience in adjusting the eye-piece.

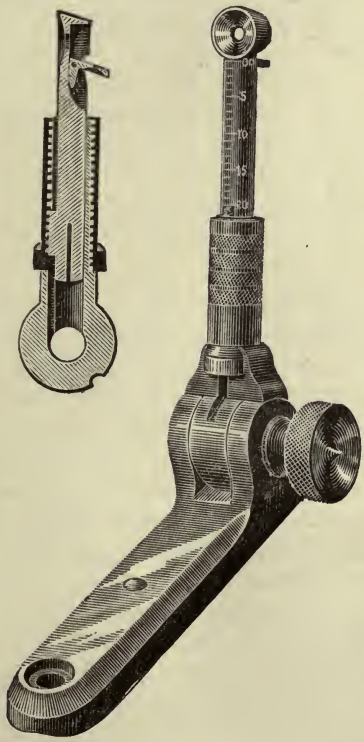
We have an excellent rifle, handy in itself and a hard shooter, but its sights have annoyed every officer who has had occasion to use it.

Before proceeding I will call attention to a rear sight made by William Lyman, of Middleford, Conn., which is most excellent. I can do better shooting with it than with any other, when the target is a moving object.

When aiming, it has the appearance of a ring or hoop, which shows the front sight and the object aimed at, without inter-



cepting any part of the view. Its rim may be instantly changed to give it a large aperture with a narrow rim, or a small aperture with a wider rim. For all quick shooting the large aperture should be used. It possesses the following advantages : it allows an instantaneous aim to be taken—the object being sighted as quickly as if only the front sight were used ; it readily permits one to shoot moving objects, running or flying, with both the eyes in use ; it is also very accurate, simple and strong. Any kind of front sight may be used with it, and it may be put on any rifle in the same way that a peep sight is attached and adjusted for shooting any distance up to 1,000 yards.



The engraving shows the manner of its construction.

7. It will be readily seen that a defective position of the line of sight will cause an inaccuracy of fire, and this may be occasioned by a false position being given to either the front or rear sight. If the front sight be to the right of its proper place, the bullet will go to the left and *vice versa*. The bullet will also be raised (range increased), since the top of the sight is lower than it is when in its proper position. If the rear sight be to the right or left of its true place, the bullet will go to the right or left, and will be lowered (range diminished), since the top of the sight will be lower than when in its true position.

8. A very frequent cause of inaccuracy of fire is the incorrect graduation of the rear sight. Of course, if the elevations corresponding to certain ranges are not accurately marked, the fire will be wild. In determining the graduation for any particular rifle, avoid all proportions and make a series of experiments with the greatest care. With a properly made arm and cartridge, and the elevating sight accurately graduated, any one can, by care and practice, become a good marksman.

9. A serious cause of inaccuracy, originating with the firer, is the faulty position that he gives to the musket in firing, by inclining to the right or left, which tends to carry the bullet to the side to which the rifle is inclined, and to diminish the range. When firing at long ranges a trifling inclination to the right or left will throw the bullet very wide of the target.

10. To prevent inaccuracies while aiming, in addition to keeping the sight vertical, the firer should observe the following:

The eye should glance from the sights to the target, being constantly on the target.

If the particular rifle carries higher or lower than the average, it must be remedied by aiming with a fine or a coarse sight. In aiming raise the rifle. Upward motion acts against gravity, and has a tendency to prevent any lateral motion of the muzzle.

Hold the butt firmly against the shoulder, and do not turn the head away at the instant of pulling the trigger. Fire low rather than too high.

11. After firing a few shots on a dry, hot day, the bullets gradually fall lower and lower, in consequence of the fouling of the barrel. The barrel should be kept clean and, as far as possible, not over-heated.

12. The condition of the atmosphere noticeably affects the course of the bullet. The more moisture there is in the air, the less the elevation required. The bullet is frequently noticed to fall immediately after a rain. Warm air offers less resistance to the bullet than does cold air. A fall of 20° in temperature will cause the bullet to lower ten or eleven inches at 300 yards range. In firing over water the elevation must be increased, in consequence of the lower temperature of the air over the water. In ascending the mountain the air becomes more and more rare, and consequently the resistance to the bullet is less on the mountain than at its base. Mirage, an optical illusion occurring in level districts on very warm days, causes the target to apparently raise in the air and become distorted in shape. This materially affects such objects as are near the ground, and engenders a tendency to shoot too high.

13. The influence of light and shade on the firing is very remarkable. On a bright day the target is refracted so as to apparently stand higher, which would theoretically require a lower elevation than on a very dull day. When the light shines directly on the target, when the target is against a light background (so that the details are better brought out), when the sun shines on the firer's back, when the atmosphere is clear, when the ground is level and uniform in appearance or when it gradually rises toward the target, the same will appear much nearer, and will theoretically require a higher elevation. The best shooting is invariably done on cloudy days when the sun's light is evenly diffused. It is very difficult to shoot well

when passing clouds intercept portions of the sun's light and heat. It is readily seen how this disturbance might set up currents in the air which would tend to carry the bullet from its course, and how the rays of light deflected from their course before reaching the eye would cause the target to apparently occupy a false position. It will be well to diminish the elevation should the sun suddenly appear and light up the target while the firer still remains in the shade, and to increase it should the target remain in the shade while the sun shines on the firer.

14. Bright sights and barrels are obviously objectionable. The reflection of the sun's light on the sights causes them to appear as brilliant points and precludes the possibility of an accurate aim. If the sun's rays come laterally the trouble will be yet greater, inasmuch as they will brighten the rear side of the front sight and the opposite side of the rear sight notch and cause a tendency to shoot away from the sun.

The refraction of the sun's rays from the polished barrel causes the target to become indistinct and to assume the appearance of motion. The sights and barrel about the muzzle should be blackened with smoke if nothing better is at hand.

15. The effect of the wind upon the trajectory and the allowance to be made therefor are most troublesome questions for the marksman. Winds are generally classified as follows :

Gentle, 4 miles per hour.
Moderate, 10 miles per hour.
Fresh, 20 miles per hour.
Strong, 35 miles per hour.
Very high, 50 miles per hour.
Gale, 80 miles per hour.

Inasmuch as the wind is continually changing in intensity and direction, it is almost impossible to make tables of allowances for it. The best skill and judgment of the marksman are brought into play when firing in mountain districts, where there are many cross-currents with which to contend. All

winds, except toward the target, retard the bullet and render a higher elevation necessary. A wind from the rear helps the bullet and tends to high shooting. Experience has shown it necessary to alter the wind gauge twelve or more feet between two consecutive shots over a range of 1,000 yards, in order to make a bull's eye each time, when the wind was too high or variable. The inclination is generally to under-estimate for wind allowance, nearly every one disliking to aim far away from the target. I believe that any one with a good mind and clear sight, possessing nerve, coolness and a quick connection between will and finger, can by practice and endeavors to correct the inaccuracies pointed out in this chapter, do good shooting.

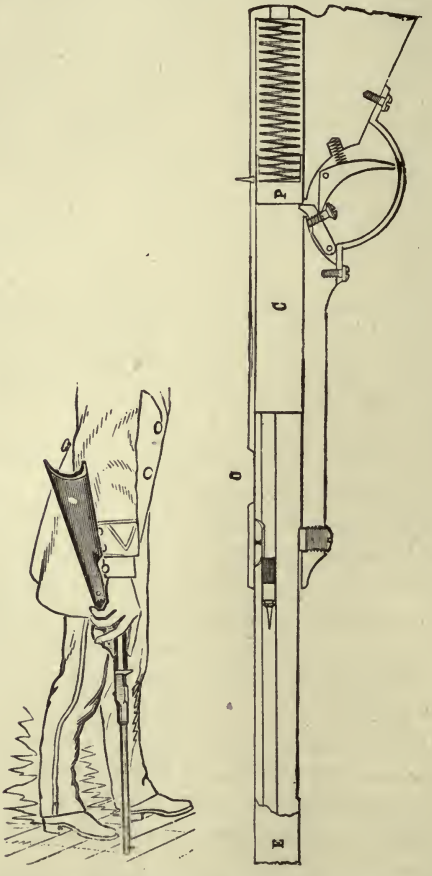
The enlisted men in our service are anxious to learn how to shoot well, and in the majority of cases are very apt scholars. It is only necessary that the officers teach them the practical correction of the errors, which they are to investigate theoretically.

In Busk's 'Hand-book for Hythe' it is stated that "one hour a day of private practice in aiming drill will, in a few weeks, make a man a first-class shot." I believe this, for the position and the aiming drills constitute the very foundation of any system of practice. It is an absurd mistake in our service to have recruits fire off-hand at a target one hundred yards distant, when they scarcely know the difference between a rifle and a shotgun, and cannot hit a barn-door thirty paces distant with either.

H. M. Quackenbush, of Herkimer, N. Y., manufactures an air rifle, which, in my opinion, is excellent for practice. I am confident if it was adopted at the various posts as a means of practice in short range shooting, it would be of great benefit to the soldier.

The drawing illustrates its principle and shows the gun loaded, ready to shoot. Pulling the trigger releases the piston (*P*), which is then thrown forward by the spring, expelling the

air from the chamber (*C*) through the barrel (*E*) with great force, carrying the dart or slug before it. To load, the barrel (*E*) is pushed into the chamber (*C*) which re-sets the piston



and compresses the spring, as above shown. The barrel is then withdrawn until the opening (*I*) in it corresponds with the opening in the head at (*O*) so that the dart or slug may

be inserted, after which the barrel is to be drawn out as far as possible, as shown. The barrel is easily pushed into the chamber, by placing the muzzle upon the floor or against some firm object, as shown in the drawing.

Having learned by practice the capabilities of the rifle, care must be exercised in its preservation. Mercurial ointment or belmontyle oil is an excellent preventive of rusting of the barrels and gun furniture—sweet oil frequently 'gums' and is not so good. Spirits of turpentine is good for cleaning the interior.

A good vegetable oil for the locks and small parts may be obtained by pouring a handful of shot or a few bullets into a bottle of oil, and allowing it to remain in the air uncorked for several days, when the clear oil on top is drawn off for use.

The stock is frequently broken, in the field, and it is often difficult for either a smith or a carpenter to mend it. This is best accomplished by rawhide lashings. I have seen stocks, broken into splinters when struck by bullets, mended and made as strong as ever by rawhide sewn around them and left to dry. Tendons and stout fish skins may be used for like purposes. Often, instead of sewing, the skin of an animal's leg may be drawn over the stock and left to dry and contract.

When the soldier, in haste or in the dark, snatches up his rifle without his cartridge belt, he is often annoyed by its becoming useless after the first discharge. This might be obviated by making fast to the rifle a small sack carrying a few cartridges, or by letting a spring locker into the butt of the stock for the same purpose. In the absence of both of these precautions the soldier should at all times carry a few loose cartridges in his pocket.

When it is necessary to fire at night, when the sights cannot be distinctly seen, a dampened lucifer match should be rubbed on the top of the front sight and on the bottom of the notch of the rear sight.

In case the rear sight is replaced by one with a more accurate graduation, care should be taken not to place it too near the eye, else it might become out of focus and indistinct when the eye is directed at the object aimed at.

It is a good rule to carry the rifle at half-cock, and never allow it to point at any one, whether loaded or not.*

* Those desiring a more thorough knowledge of this subject are referred to the excellent work of General George W. Wingate.

CHAPTER III.

MEDICAL AND SURGICAL HINTS.

Peculiar and local diseases prevail in nearly every section of country; and wounds from gun-shot and weapons, bruised and broken bones, are casualties that may befall men in the field at any time. It is, therefore, important for those in command to have, in all cases of emergency, a sufficient knowledge of medicine and practical surgery to enable them to relieve the sick and wounded (both men and horses) until professional aid can be secured.

Before taking the field, for a long or indefinite period, if the transportation will permit, see that you have compactly stored, in good shape for packing, the following articles: a case of pocket surgical instruments, consisting of, at least, a lancet, scalpel, small knife, forceps and scissors; a few rolls of sticking and adhesive plaster; some silk, needles and waxed thread; an assortment of bandages, splints, sponges and some red flannel; some lint, oil-silk and tow; a flask of wine or brandy; a hypodermic injection syringe; a tourniquet and small cup; blue mass, quinine, opium and cathartic, put up in usual doses; a little chloroform, laudanum, hartshorn, camphor, solution of morphia, iodine, tincture of chloride of iron, chloride of lime, tincture of myrrh and aloes, tincture of arnica (excellent for strains and contusions), spirits of nitre, ammonia and turpentine; sulphates of iron, zinc and copper; pulverized indigo, carron oil, saltpetre, tartar emetic, nitrate of potash, prepared chalk, tincture of opium and catechu, cantharides (in powder), sugar of lead, acetic acid and powdered mustard; emetics and aperients (mild and powerful); nitrate of silver

in a holder; cold cream or glycerine (cooling for irritated surfaces); a cordial for diarrhœa, a sudorific (Dover's powders excellent), and some simple cerate or a mixture of wax and lard; some alum, Jamaica ginger, castor oil, linseed oil and meal, flaxseed, and an assortment of cathartic, diuretic, sedative, febrifuge and alterative 'balls'; also some astringent ointment (one part acetate of lead and three parts of lard), hoof ointment (equal parts of tar and lard) and strong liniment.

I would urge that each soldier, on going into the field, carry on his person, in a waterproof pocket or envelope, a bandage and piece of lint—such a precaution will often avoid much suffering.

If easily procured, any of the following excellent dressings and disinfectants against decomposition of wound discharge swill be found very useful;—carbolic acid (in weak solution), permanganate of potash (applied with glass syringe), chloride of zinc (in weak solution), chloride of lime (as a lotion), and charcoal (powdered and sprinkled on the poultice).

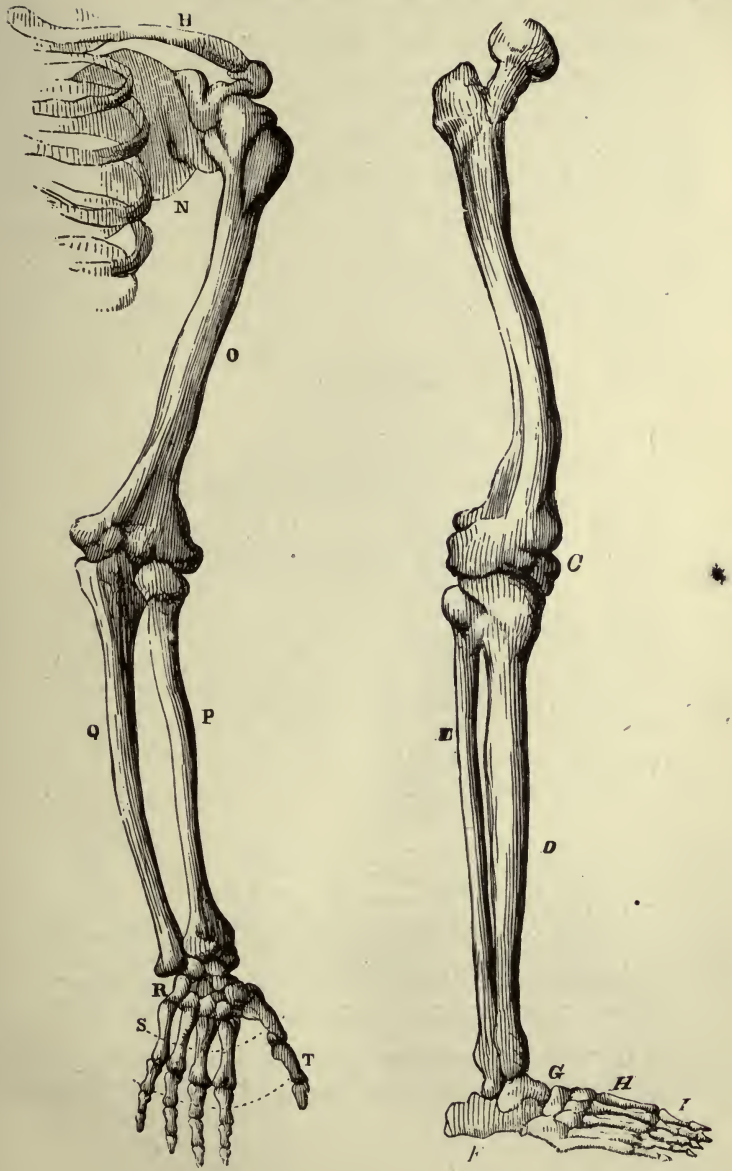
The fracture or dislocation of a limb is the most frequent of all accidents attending a mountain journey. A mis-step of the traveler or a fall of the horse often results in this mishap.

For the benefit of those who are not informed as to the shapes and locations of the most exposed bones of the body, I will produce on the opposite page an accurate illustration of those in the upper and lower extremities.

Referring to the arm is seen H, the shoulder blade; N, the clavicle; O, the humerus; Q, the ulna; P, the radius; R, the carpus; S, the meta-carpus; T, the phalanges.

Referring to the leg is seen C, the femur; E, the fibula; D, the tibia; F, the heel-bone; G, the tarsus; H, the meta-tarsus; I, the phalanges.

By carefully observing the shapes and positions of these


M
N
O
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bones, any one might reset the parts, place the splints and greatly alleviate the suffering in the absence of the surgeon.

When fractures occur and there are no splints at hand, they must be improvised from such materials as may be found. If the thigh be fractured, a rifle may be used for a splint, placing its butt in the axilla, and allowing it to pass along the outside of the limb, being secured by bandages around the trunk and ankle.

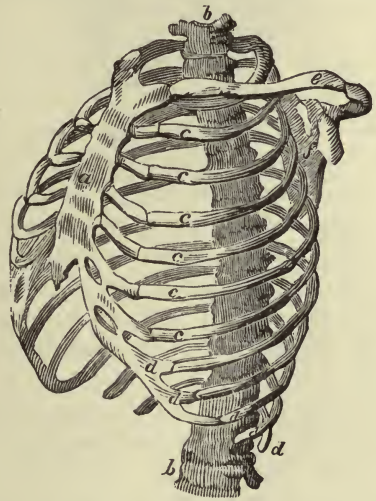
A fractured leg may be secured with a splint of any description placed along its outside and the whole then wrapped in a coat or blanket and made fast by straps.

It is a splendid plan to tie the fractured leg at the ankles, and convenient points, to the uninjured leg, and rest it on a knapsack or piece of board. Coats, blankets or some soft material should be placed underneath the leg. In this manner the two legs will move as one and the broken bone will not injure the flesh.

A fractured leg may be 'put up' with a gun stock or sword scabbard—even a roll of straw or grass makes a good temporary splint.

A fracture of the arm may be 'put up' with a bayonet scabbard or with thin bundles of straw or grass. Light pieces of board, bark or even the soles of shoes or boots are often useful for splints. The fore-arm should be carefully supported in a sling. Often a severe shock or collapse from pain or nervous fear follows the fracture, in which case a stimulant (whisky and water) should be administered.

Dislocated and broken ribs are often the results of falls and other accidents. The following illustration shows the



normal position of the ribs and adjacent bones—*a* is the breast-bone ; *c. c. c.* the ribs, which are fastened at one end to the spine *b. b.*, and at the other end are attached to the breast-bone by means of strips of cartilage, *d. d. d* ; *e* is the collar bone. There are twelve (12) ribs on each side, all of different lengths—the shortest are at the top and have the smallest curves ; descending they increase in length to the seventh, which is the longest, then decrease. The last two

have no cartilages, are very short, and are attached to the spine only.

The following drawing shows the formation of the pelvis, and the sacrum, which supports the spine.

It is frequently injured by gun-shots, and it might be well to bear in mind its form and position.

To know how to arrest bleeding is all-important, as life may often be saved by promptly adopting simple means.

Bleeding may be from veins or from arteries. In the first case the blood is of a dark color, and flows slowly in a stream towards the heart; in the second case it is of a bright red color, forcibly issues in jets, and is in a direction from the heart.

In ordinary venous hemorrhage, such as the bursting of a varicose vein, the bleeding may be stopped by pressure or elevation of the limb. Should there be any difficulty in checking it, ligatures should be applied.

When the bleeding is arterial the limb should be firmly grasped by both hands above the wound, so as to cut off the current from the heart by firmly compressing the wounded vessel against the bone, until a tourniquet may be applied.

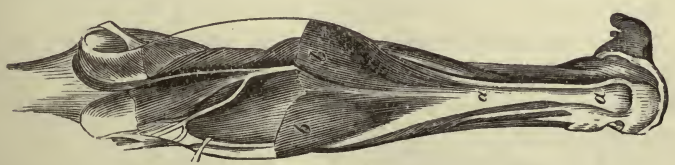
A temporary tourniquet may be adjusted by placing a flat or roundish stone over the course of the artery and above the wound, between it and the center of circulation, holding

it *in situ* by means of a band, handkerchief, string or thong, the ends of which are securely tied. A stick or bayonet is then passed through the band or thong and twisted round and round several times, until the band is so tightened as to press the stone forcibly on the artery, which, being compressed against the main bone of the limb, will cut off the passage of blood through the vessel. If the bleeding be from the hand, fore-arm or arm, apply the tourniquet or bandage near the shoulder. If from the foot, leg or thigh, apply it between the knee and hip.

As a rule the main arteries are so placed that they are not likely to be reached and injured; they are deep in the flesh, and follow the courses of the inner seams of the coat sleeves and pants. Thus the main artery of the arm runs from the axilla down the inner side of the arm, at the lower edge of the biceps muscle, to the end of the elbow; that of the thigh runs from midway the groin, down the inner side of the thigh, under the deeper muscles to the back of the thigh near the ham.

Ice, if convenient, may be applied to wounds of small vessels, with good results, causing a rapid congelation of the blood. Hot water will accomplish the same, and is far preferable if the patient be feeble. When the patient becomes faint and insensible from loss of blood, he should be placed flat on his back, with his head low. Cautery may be resorted to when the tourniquet fails to do its work.

The accompanying drawing will serve to show the at-



tachment of the muscles *a b* to the bone, the functions of ligaments and the manner in which the arteries are covered and protected by the muscles.

In resetting a strong and muscular limb it is often necessary to keep up a great strain on the muscles in order to weary them and cause them to relax, when the bone may be set with less difficulty.

Besides the wounds caused by gun-shots, a person in the field is liable to a great variety of others, which might be classified according to the nature of the article or weapon with which they are inflicted, as incised, punctured, lacerated and contused.

Incised wounds, such as are made by a sword or knife, should be carefully cleansed, all extraneous substances removed, the edges brought together, adhesive plaster applied, and the muscles near by relaxed.

Punctured wounds, such as are made by bayonets, pointed rocks, etc., very often excite inflammation in their vicinity, cause formation of matter under the fascia and frequently result in hemorrhage. The wounded part should be kept at rest, all sub-cutaneous oozing of the blood prevented, and an exit made for the discharge. If suppuration sets in, an incision should be made at once in order to let out the pus. Probing in search of extraneous matter is very hurtful.

Lacerated wounds, such as are inflicted by blunt and obtuse bodies, are invariably attended with severe pain, are slow in healing, and are very liable to gangrene. They should be thoroughly cleansed, all foreign bodies removed and the flaps of torn skin replaced as far as possible. A good poultice and disinfectant should be applied to the wound.

Contused wounds, such as are produced by any blows without breaking the skin, should be attended to without delay, the parts restored to the normal state by a few days of rest, and some stimulating liniment applied.

For a contusion of the head, apply cold water, administer cathartics, make the diet light, take no stimulants and remain quiet.

For scalp wounds, cleanse the exposed surfaces and replace the torn scalp—the parts will generally heal; if abcesses form they should be evacuated by timely incisions.

In the treatment of wounds the diet should be carefully atten led to. In cases like a wounded lung it is necessary to reduce the patient to nearly a state of starvation.

The most excruciating pains from shots are readily relieved by the hypodermic injection of a solution of morphia. Ice, if procurable, will subdue inflammatory symptoms. No description of spirits should be poured upon a bleeding wound, as it only serves to irritate and influence it.

A wounded man is always thirsty; give him cold water, but never spirits.

The following remedies may often be used to great advantage:

Scurvy may be prevented by using the following antiscorbutics:

1. Fresh vegetables, wild onions, fresh fruit, and even unripe fruit, with a risk of diarrhœa.
2. Dried or canned vegetables, especially potatoes and cauliflower.
3. Vinegar, citric acid or lemon juice.
4. Citrates, malates, tartrates and lactates of potash, used in food or drink.
5. Pure air, exercise and cleanliness.
6. Tincture of chloride of iron, taken daily, or infusion of hemlock leaves.
7. Raw potatoes and fresh raw meat.

Malaria should be promptly checked. Quinine in sufficient doses is the remedy. A halt to the leeward of a marsh or swamp should be avoided. A camp on low ground is often less affected by malaria than the low hills that overlook it. Violent exertion, resulting in exhaustion and perspiration often averts an attack, and any simple aperient is likewise good.

Diarrhœa may be treated with an ounce of castor oil and fifteen drops of laudanum suspended in water. The patient should eat neither bread nor meat, but confine his diet to a little rice broth, thickened milk and the like. If it is accompanied by severe cramps, apply hot rocks or pans to the feet and hot fomentations to the stomach.

Poisoned persons must be treated with the greatest caution, inasmuch as it is necessary to deal with dangerous remedies. Some poisons are best ejected by vomiting, and an emetic should be promptly given; in others, the action on the stomach may be diminished by oily and mucilaginous drinks, such as magnesia, milk and oil, barley water, flour and water and raw eggs.

For poisonous acids, such as nitric, oxalic, muriatic or sulphuric acid, avoid emetics. For nitrate of silver, give plenty of salt water, followed by barley water or gruel.

For strychnine, narcotic poisons, opium, mushrooms, belladonna, etc., give strong emetics at once, pour cold water on the head, neck and shoulders, place mustard poultices on the feet and keep the person moving about, giving strong coffee as a stimulant.

Water should always accompany the emetic, to make the vomiting easy, and great effort made to prevent the patient from becoming drowsy and stupid. A charge of gunpowder swallowed in water, mustard in hot water, or warm soapsuds are prompt emetics.

In the absence of all these a careful tickling of the throat often does the work.

The following are good poultices: *Mustard poultice*—two ounces powdered mustard, two ounces linseed meal, eight ounces boiling water; *Charcoal poultice*—one-third ounce charcoal, two ounces bread, one ounce linseed meal, eight ounces boiling water.

For *suffocation by gases, etc.*, remove the patient to pure air, apply cold water to the face and chest, rub the body

lively, give hot coffee or spirits, and endeavor to induce artificial respiration.

To revive an apparently drowned man, proceed as set forth in the Appendix.

For *sore and blistered feet*, strong whisky and melted tallow rubbed on the foot, which is afterwards covered with a sock, act well. Great relief is found in tepid bathing, a small quantity of alum or salt being dissolved in the water. The feet should be washed daily, while on the march, and both the feet and inside of the stockings should be well soaped. In severe cases of soreness, a raw egg broken in the boot before putting it on is a splendid antidote. Blisters of the feet should not be opened, but a thread should be drawn through them and the liquid allowed to run off. If the foot soreness is simply owing to bad boots or socks, relief may be often found by changing the boots and socks from one foot to the other, and turning the stockings inside out.

Chafing is remedied by keeping the parts clean and powdering with fuller's earth. Sprains are relieved by hot fomentations and by rags kept saturated with cold water and bound round the parts.

Burns and scalds are treated by keeping them from exposure to the air and applying carron oil (a mixture of equal parts of oil and lime water), flour, or scraped potatoes.

Snow blindness is an affection to be met with in all mountainous localities where there are glaring sheets of snow. Some persons are simply blind, others experience great pain, the lips chapping and the face and exposed parts severely blistering.

A person having once experienced snow blindness, is subject to frequent attacks.

Green or blue glasses and a green lined broad brimmed hat give the eye protection. In the absence of glasses, wet powder and grease, or charcoal, smeared on the nose and about the eyes, will afford much relief

A few drops of opium, in tincture, placed within the eyelids will also afford relief.

Water and weak brandy is an excellent eye-wash.

For *sunstroke*, remove the collar and stock, loosen the shirt and coat, and continue to throw cold water on the head and spine until consciousness returns.

For *wasp and scorpion stings, etc.*, extract the sting, if it remains in the wound, and rub acetic acid, the nicotine from a pipe or chewed tobacco, upon the wound.

Rattlesnakes and venomous reptiles are met with on nearly every mountain trail. Rattlesnakes seldom bite (except in August, when they are blind and snap at anything), yet it is well to know the antidotes.

The Western mountaineers place great dependence on strong whisky. The action of the poison seems to counteract the effects of the whisky, and a very large quantity may be taken without causing intoxication. No time should be lost in administering the spirits.

Hartshorn applied externally and taken internally, in small doses, is a good remedy.

Plantain leaves finely chewed and applied to the wound, after sucking out the poison, are also good.

Pulverized indigo made into a soft poultice will draw out the poison when applied to the wound. The poison turns the indigo white. When the indigo ceases to change color it is a sign that the poison has been withdrawn.

In the absence of antidotes, tie a ligature as firmly as possible above the wounded part, suck the wound, if the mouth and lips be free from sores, and caustic it. If no caustic be at hand, explode gunpowder into the wound, or burn it out with the end of a bayonet or ramrod heated to a white heat, avoiding the arteries.

Use every effort to prevent the patient from falling into the lethargy and drowsiness that always follow.

The following cruel course is taken by the Indians of the

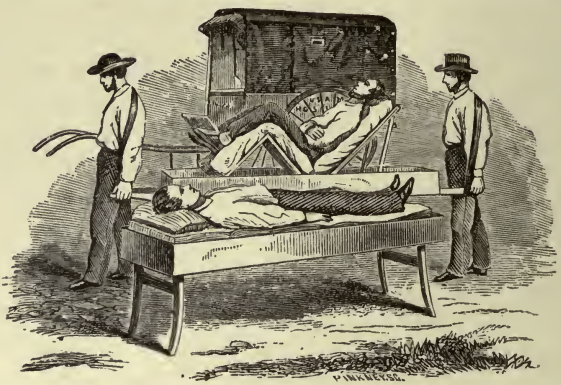
Northwest in treating a poisonous bite :—a bird or animal with a quick circulation of the blood is secured, an incision is made into the flesh of the creature and placed in contact with the wound. The bird or animal soon dies. This is repeated several times until the contact produces no effect, when the victim is considered out of all danger. A bandage is generally placed between the wound and the heart to prevent the return of venous blood.

A few years since an Indian scout was riding with me, several miles in advance of the command. While crossing a timbered ridge we came upon a number of 'fool-hens.' Not wishing to fire shots, we secured long poles and began to knock them off the logs and trees. As the unfortunate Indian stooped to pick up his first bird, not dead, but merely stunned, an immense rattlesnake struck him on the back of the left hand. Without hesitation he made an incision in the breast of the fool-hen and applied it to the wound. At his request I secured four other birds, which he used in like manner. Three died from the poison; the fourth one was not affected by it, but was subsequently killed and eaten. The Indian continued in good health, and never experienced any suffering or inconvenience from the bite. Indians have been known to sacrifice their dogs and even horses in this manner, when no bird or other animal could be secured.

On taking the field, provision should always be made for transport for the sick and wounded, in case there be any. If wagons are to accompany the command, one or more should be so fitted up as to be easily converted into ambulances in cases of emergency.

The drawing represents such a contrivance. The two stretchers shown are detachable, and may be placed inside the wagon when moving over level roads, or may be removed and transported by men when moving over rough and rocky country, or when it becomes necessary to take the wagons

apart in order to get them up or down very steep places.



The stretchers are so constructed with hinges and hooks as to be folded into a very small space when not needed, and to permit the supports to be used as handles.

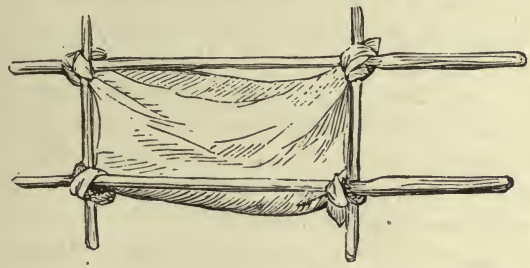
Being frequently detached from all transportation, an officer in command might be called upon, in case of accident, to resort to numerous expedients to relieve the sick and succor the wounded. He should know how to make stretchers and how to transport them.

Avoid carrying the stretcher on the shoulders. The front and rear bearers of the stretcher should be 'out of step,' and men of equal height, strength and length of step, so far as is practicable, should be selected. The sick or wounded man should be carried with his face toward the direction in which he is moving. In crossing ditches, dikes, hollows, fences, etc., the stretcher should be kept horizontal.

The following stretchers may be readily extemporized :

1. A blanket is held by four men, one at each corner, and is then doubled so that the two loops shall be brought together at each end ; one pole (or two rifles lashed together) passes through the four loops, while another passes within the double of the blanket on the other side.

2. Roll a small stone into each corner of the blanket, and thus form projections which will prevent the slipping of the strings or thongs with which it is made fast to a frame of poles (or rifles lashed together), as shown in the drawing.

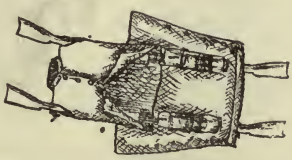


Strips of the blanket may be used for strings.

This stretcher may be still further simplified and less material required when two corners of the blanket are fastened to a short cross-piece at the head, while the other end is gathered up and tied altogether to the main pole.

The pressure of the pole on the shoulder (most readily borne on the shoulder) when bearing the stretcher, may be diminished by a short pole or gun held lever-wise over the other shoulder, so as to take a portion of its weight.

3. Four rifles and two coats, in a great emergency, may be made into a stretcher. The sleeves of one coat are turn-



ed into the inside. The rifles are then passed through the sleeves (muzzle to muzzle) and firmly lashed together, when each coat is buttoned throughout the front.

For a man who can sit up, one rifle through the sleeves of a coat, and the coat tail lashed to another rifle, will form a

good stretcher. The sick man may bear against one of the bearers and let his legs hang down

4. A stretcher may be made by suspending an ox, mule or horse hide between two poles, or by interlacing the belts and gun-straps. Even the knapsack may be fastened between the poles or rifles so as to form a good transport.

5. If it is possible to transport a wagon, a stretcher made of belts, ropes, etc., may be hung from its sides within, or the bottom of the body of the wagon may be filled with blankets, small branches covered with straw, hay, ferns, rushes or any soft material.

A man who is unable to walk, but who can sit and practically support himself, may be transported by two men, who either support him on a short pole held between them, with his arms upon their shoulders, or join their hands and arms so as to make a comfortable seat for him.

6. Three cross pieces are lashed to two elastic poles, eight or ten feet long. This frame-work is then supported over the wounded man as he lies on his blanket or canvas and the latter is securely fastened to the frame. One cross-

piece is in front of the feet, another behind the head, and the third one being over the man, will steady him in the trans-

port. Small twigs may form a framework, which, covered with a blanket or coat, will protect the sick man from the sun, wind or rain.

After a fight the Indians carry their wounded wonderful distances, palanquin fashion.

If horses can be spared they may transport the litter instead of men. In this event the poles should be very elastic, about eighteen feet long, united by cross-pieces three-and-a-half feet long, the ends being firmly secured to the sides of the animals by strong fastenings. The Indians often use one horse with this litter, allowing one end to trail on the ground. When only one animal can be spared, great caution must be exercised in passing over broken and rocky ground.

In case of a great emergency, after knotting together the ends of a blanket, two men could be laid in the bights and transported, one on each side of the horse, the central part of the blanket being laid across the horse's back and secured. The Indians frequently transport their children in this manner.

The foregoing are some of the numerous contrivances for transport, depending upon the nature of the material available and the officer's ingenuity.

'*Bed sores*,' a form of gangrene from pressure, appear on the sacrum, elbows, shoulders, back of head and trochanters, when the patient is constrained to lie for a long time in one position. For treatment, remove pressure as far as possible, wash and remove sloughs if they exist, and apply a soft poultice. Myrrh, resin, iodine and other warm astringent applications are good.

If possible, visit a dentist and see that your teeth are in good order before going into the field.

This chapter would hardly be complete without a few hints and directions as to the treatment of the stock, in the absence of a qualified veterinary surgeon.

Sore mouth is caused by the cutting and tearing of the bit at the corners of the mouth. To cure it wash the mouth clean and sprinkle common salt on the sores or apply tincture of myrrh.

Cut tongue is caused by severe jerks of the bit, and is often very serious. Salt water, alum water, saltpetre and tincture of myrrh are good remedies.

Sore back should never occur in a well-regulated expedition. The slightest tendency to gall should be promptly looked after ; and, if necessary, the rider should walk until the back is perfectly sound. Hot water and poultices make the best early treatment. Leather, burned to a crisp and finely powdered, when spread over the wound, causes it to heal very promptly. There is no excuse for the frightful wounds on the backs of mules and horses due to improper saddling.

Diarrhœa, often caused by exposure, over-exertion and an excess of spring water, is best treated by giving a mixture of tincture catechu, prepared chalk and tincture of opium (in the proportion of one, two and four parts) followed by gruel and hay.

Colic is one of the most frequent ailments of the horse. The water, grain and grass of many districts cause severe attacks. As remedies, mix a tablespoonful of laudanum and twice as much whisky in a cupful of water, or dissolve some chloride of lime (about a tablespoonful) in a cup of water, and pour down the horse's throat.

If there be much constipation give dissolved aloes (four drachms), apply hot fomentations and bleed, taking about one gallon of blood.

To bleed the horse rub the neck on the near side, near the throat, until the vein rises, tie a bandage around the neck about its middle and strike the fleam into the vein ; when it is full, hold the horse's head well up and pry open his jaws until the blood flows sufficiently.

Megrims or *vertigo*—a sudden rush of blood to the head of the horse, generally when ascending a hill, may be relieved by prompt bleeding, followed by the 'cathartic ball.' A horse so affected suddenly stops, shakes his head and often falls unconscious.

Cramps, colds, spasmodic coughs, etc., are often caused by applying cold water to the heated back or by drinking cold water when overheated. To cure, blister the throat, if sore, and give a little nitre or aloes; or, give a mixture of one ounce Jamaica ginger, one cup of rum and two cups of water in moderate doses.

Corns, or the bruising of the sensitive parts of the foot by the contraction of the hoof, if neglected, will produce severe lameness or even *quitter*. They are indicated by the horse's placing one foot in advance of the other and resting upon the toe. For treatment, cut away the hoof so as to relieve the pressure, cut out and cauterize the corn.

Apply flaxseed poultices and hoof ointment, and shoe carefully when the foot will permit it.

The illustration shows a convenient form of boot to be used while the foot is undergoing treatment.

For *thrush*, a deceased action of the sensible frog, secreting pus instead of horn, wash the feet with soap and water and apply ointment (equal parts of tar and lard melted). If neglected it will run into *canker*.

Sand-crack, a disposition in the hoof to crack, often occasioned by poor shoeing, may be abated by frequent applications of linseed meal poultices, after washing with soap, water and powdered charcoal. Cautery is necessary in severe cases.

Quarter-crack is caused by pressure and contraction, most

frequently the result of fitting the shoe too tightly on the inner quarter, in order to prevent interfering.

It is treated by making a groove (with a rasp) under and parallel with the cornet, to the extent of about one-half inch on each side of the crack. A few small notches are then cut on each side of the groove, and the edges of the crack cut away. Finally the crack is cauterized and dressed with tar every morning for several weeks. In the course of time the incision works its way down to the bottom of the hoof, followed by a sound foot covering.

For *punctured feet*, extract the cause of injury and poultice until the pain subsides; then apply tar and tincture of myrrh, keeping the foot in the boot.

For '*grease*,' remove the hair, apply finely-powdered charcoal and poultices; give 'cathartic ball' and feed green food, if possible.

When *ticks* are abundant, oil or fat smeared around the fetlock or pastern is a protection against them.

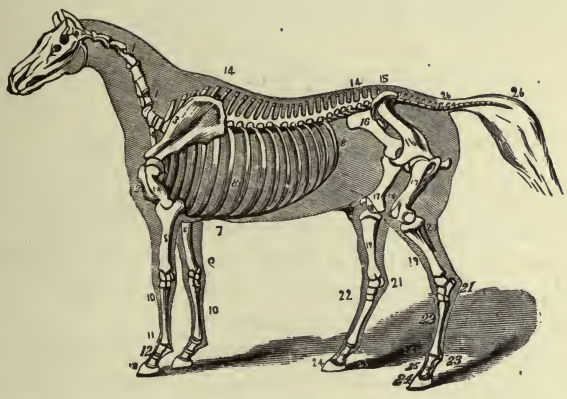
For *epizootic*, *influenza*, *distemper*, *etc.*, give an ounce of spirits of nitre in a bucket of water three times daily. Feed little grass or hay, but give oatmeal gruel frequently, and blister the parts if there be much soreness.

Certain flies often deposit their eggs in wounds, and even in the 'sheaths' of well animals, which soon develop into a living mass of carnivorous larvæ. The remedy is to thoroughly cleanse the parts and blow calomel into the wounds.

Animals are frequently poisoned by drinking alkaline water. For treatment, rake the animal and pour grease or mild acid down his throat, or dose him with flour and water.

Wounds and contusions should, if possible, be cured by the continued application of hot fomentations, poultices and cold water; still, an escharotic is often necessary, and blistering is good in severe cases of sprains.

The drawing will give an idea of the osteology of the horse.



1. The seven bones of the neck.
2. Breast bone.
3. Shoulder blade.
4, 5 and 6. Humerus, radius and ulna.
7, 8. Cartilages and ribs.
9, 10. Carpus and meta-carpal bones.
11, 12, 13, 23, 24, 25. Upper and lower pasterns and coffin bones of the fore and hind feet.
14. The eighteen bones of the spine.
15. The six bones of the loins.
16. The haunch.
17, 18, 19, 20. The femur, knee-cap, tibia and fibula.
21, 22. The hock and meta-tarsal bones.
26. Caudal vertebræ.

A knowledge of the functions and location of these bones will often assist greatly in treating fractures and dislocations.

CHAPTER IV.

USEFUL INFORMATION IN POST AND FIELD.

SHOULD the substance of the following items become impressed upon the memory of the soldier, I feel sure that he will find some of the hints useful when in positions of responsibility and having few or no facilities. I have numbered the paragraphs for the convenience of future reference.

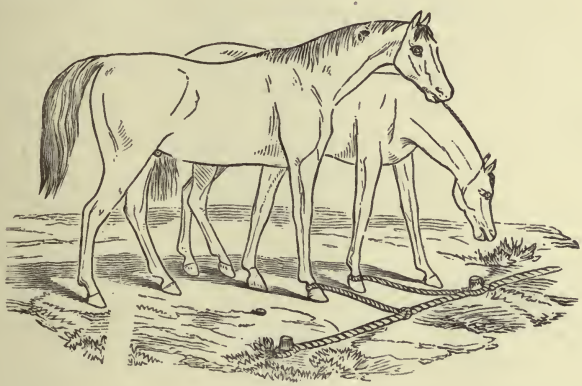
1. When the boots or shoes become water-soaked, it is a splendid plan to fill them full of oats or barley, if at hand. The grain rapidly absorbs the moisture and, in expanding, prevents the boot or shoe from shrinking.

2. The efficiency of the following method of picketing horses or of even securing the ropes of a tent in a dry and sandy soil, where the pickets or pins will not hold, is wonderful.

Simply tie to the end of the rope some article with a longitudinal dimension of at least four inches; anything will do—a stick, some twigs, a stone or tent peg. Plant this from one to three feet in the sand. If it be buried one foot deep in ordinary dry and sandy soil, it will require a strain of about 25 pounds to draw it up; if it be buried two feet deep, it will require a force of more than 80 pounds to draw it up, and it will require more than 500 pounds if buried three feet deep.

Theoretically this is obvious—for, supposing the earth to consist of smooth, spherical grains of one size, and granting that these grains cannot move horizontally at the moment of drawing, and that they *must* move vertically upwards, it is plain that the substance attached to the rope when moved upwards must start before it an inverted pile of grains. Take the most unfavorable case, supposing it to be a triangular pile, then the

number of grains to be started varies as $\frac{n\,(n+1)\,(n+2)}{1.\ 2.\ 3.}$, or in a ratio greater than n^3 (n being the number of layers of sand above.)



A rope attached to several of these planted ropes, and resting on the ground, will form a good picket line.

3. When cavalry and infantry are advancing rapidly together, the infantry are greatly assisted when permitted to lay hold of the stirrup-straps of the horsemen.

4. To calculate the weight of a stack of hay, measure the length and breadth of the stack, also its height from the ground to the eaves, and from the eaves to the top.

Find the continued product of the length, breadth and height from the ground to the eaves, augmented by $\frac{1}{3}$ the height from the eaves to the top, and multiply the result by fourteen-thirds. The product will be the weight of old hay in pounds.

New hay weighs, in bulk, $\frac{2}{3}$ as much as old hay.

For example, suppose a stack of old hay to measure sixty feet in length, twenty-four feet in breadth, nine feet from the ground to the eaves, and six feet from the eaves to the top;

then, $60 \times 24 \times (9 + \frac{6}{8}) \times \frac{14}{8} = 73{,}920$ lbs. The same sized stack of new hay would weigh 49,280 lbs.

5. To render canvas, duck or even calico waterproof, prepare a mixture of melted wax and spirits of turpentine in the proportion of one ounce wax to one pint of spirits. After having stirred the mixture well, dip the material into it and hang it in a current of dry air.

To make tarpaulins, soak the canvas in salt water and apply the dressing; as the water evaporates the tar enters the fabric.

Boiled linseed oil, when soaked into cloth or linen, will cause it to resist the action of water.

6. Frequently of necessity, the camp is made on a sandy beach where there is no sign of fresh water. In such a case, the mules, if permitted, will paw and dig up the sand near the water's edge, and slowly satisfy their thirst by drinking the fresh water as it trickles through the sand in small quantities—but this process is very slow.

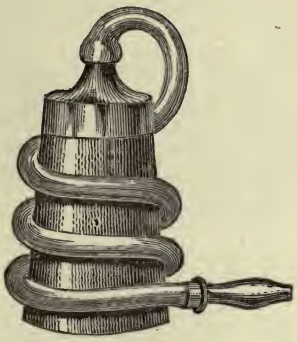
To distil salt water in an emergency, take a camp kettle full, cover the top and insert a gun barrel at the top inclining downward. Keep the barrel cool by means of water, and cause the water in the kettle to boil. The condensed steam may be caught at the lower end of the barrel and consumed.

If there be no conveniences at hand, find a hollow in the rocks, or make a hole in the earth and fill with salt water. Drop hot stones into it until the water hisses and gives out large clouds of vapor, which may be caught by a cloth suspended above, and then be wrung from it or sucked out. One drop a second would make about a gallon in one day.

Muddy water may be purified by filtering—sand, charcoal, sponge, grass, moss, stone and cloths being good filters.

The illustration represents a convenient apparatus for purifying muddy and impure waters. It is so constructed as to fit into the mouth of a canteen or bottle, and permits the water to be sucked out after passing through the filtering substances,

and being freed from the ova and larvæ of many water insects



and other impurities suspended in it. In its absence, suck the impure water through the handkerchief or a handful of grass or rushes held close together, or even through snow.

A small piece of alum placed in muddy water will purify it wonderfully well, the alum and mud forming a clayey deposit.

Putrid water should be boiled with charcoal before drinking it. The Indians purify all waters by plunging hot irons and rocks into them.

When very thirsty, and only a very small amount of water is at hand, drink it with a spoon, or through a small hole in the cork of the canteen. It will do as much good as when taken in large mouthfuls.

7. The following is a table of the dangerous spaces, in yards, of the Springfield rifle and carbine, calculated under the assumption that the gun, when fired, is 56 inches above the ground, and aimed at the middle points of infantry and cavalry soldiers, 34 and 48 inches above the horizontal, respectively.

The dangerous space will be increased by the firer lying down or aiming at his adversary's feet.

For the rifle, the range corresponding to the maximum dangerous space is 262 yards for infantry and 291 yards for

cavalry; and for the carbine, 204 yards for infantry and 230 yards for cavalry.

Horizontal Distance.	RIFLE.						CARBINE.					
	Agst. Infantry.			Agst. Cavalry.			Agst. Infantry.			Agst. Cavalry.		
	Rising branch of trajectory.	Falling branch of trajectory.		Rising branch of trajectory.	Falling branch of trajectory.		Rising branch of trajectory.	Falling branch of trajectory.		Rising branch of trajectory.	Falling branch of trajectory.	
		Before object.	Beyond object.		Before object.	Beyond object.		Before object.	Beyond object.		Before object.	Beyond object.
100	40	60	77	40	60	130	40	60	59	40	60	99
200	90	110	71	90	110	103	80	120	53	80	120	80
300	52	100	55	71	150	80	37	60	42	29	84	60
400	28	60	41	33	88	60	20	43	37	18	60	53
500	21	40	30	22	59	42	13	36	30	14	50	43
600	15	29	24	16	40	34	11	29	22	10	41	30
700	12	23	21	13	32	31	8	19	15	8	28	21
800	9	20	18	10	28	25	6	13	12	7	18	18
900	8	17	15	8	23	20	5	12	10	8	15	15
1,000	6	13	12	7	19	17	5	9	7	5	13	11
1,100	5	11	7	6	16	8	4	6	2	4	9	6

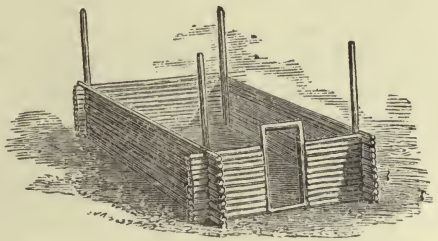
8. When detached without canvas for a long period of time, it is better to spend the spare time in making a temporary house than in idleness.

A good hut may be readily constructed on suitable ground or a hillside by excavating and covering with a roof; but if timber is convenient, it is better to build a log hut, covering with bark, skins, bushes, reed mats, sea weeds or any suitable material procurable.

In building the hut four poles are planted in the ground where the corners are to rest.

The logs are then piled one above another against these poles, as shown in the drawing, being notched where they cross so as to bring their sides together.

After the walls are completed the doors and windows are



cut, a hole chopped through the logs, including that on the ground, for a fire-place (a chimney and fire back may be formed of clay, turf, stones, etc.,) and the roof put on.

A roof of split logs gouged out in the center, like a long curved gutter, is good. A layer is placed side by side, with the hollow side up, and a second layer is put on them, with the hollow side down.

Bark taken in long strips makes good roofing or sides.

The roof should have a pitch of not less than 45° to keep out the rain. All the cracks should be carefully filled with moss, grass, mud, clay, etc.

Good substitutes for window panes are waxed or oiled paper or thin white cloth.

The huts of Indians and all savages are generally round or approximate to the circular form, probably because of the maximum house for a minimum cover.

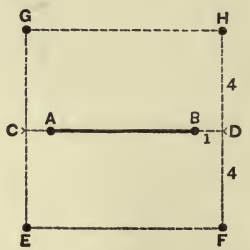
It might be well to remember that logs split better from the crown or small end toward the butt.

9. When destitute of all tools, to fell a tree; light a small fire about the root, prevent the same from flaming upwards by applying leaves, etc. After the fire has burned out a portion of the tree, move it aside and knock away the charred wood, thus exposing a fresh surface for the action of the fire. One man can attend to the burning of many trees at once, if desirable.

After the trees fall, the tops and branches may be burned off as they lie on the ground.

10. The following weights and estimates are often valuable when purchasing supplies in the field: One bushel of wheat weighs sixty pounds; of rye, fifty-eight pounds; of barley fifty-four pounds; of oats, forty-two pounds; of beans, sixty-two pounds; of peas and maize, sixty-six pounds; of potatoes, sixty pounds; of onions, fifty-six pounds. About fifty pounds of wheat and thirty pounds of oats go to the cubic foot. One cubic yard of well-pressed hay weighs 225 pounds; one cubic yard of straw weighs 145 pounds; one cubic yard of grain will average twenty bushels. The following numbers of bushels will safely go to the acre; wheat, rye and beans, 25; oats, 45; barley, $37\frac{1}{2}$; peas, 25; maize, 30; potatoes, 250.

11. To properly pitch the ordinary wall tent, after selecting



a suitable spot, place the ridge pole, *A B*, upon the ground, approximately beneath its place when in position. Drive pins at *A* and *B*. From *A* and *B* continue *A B* to *C* and *D*, by stepping one pace from each end. From *C* and *D* make four paces at right angles with *C D* on each side, and determine the points *E*, *F*, *G*, *H*. At these points drive the corner tent pegs. By following these directions the tent may be promptly pitched and will make a beautiful appearance, every portion of canvas being in proper position and free from wrinkles.

The drawing shows the form of the tent when properly pitched.

12. The cubical contents of a trench equals $\frac{1}{3}\ h\ (ab + cd + \frac{1}{2}\ ad + \frac{1}{2}\ bc)$ in which a and b are the length and breadth of the top of the ditch, c and d are the length and breadth of the bottom and h the depth.

13. The mean velocity of water in rivers equals $\frac{(\sqrt{v}-1)^2+v}{2}$, when v is the surface velocity expressed in inches.

The surface velocity may be determined by carefully noting the time required for a chip or any small substance to float a measured distance.

The following are the usual expressions applied to river velocities:

Sluggish, about	1½	ft. per sec., or	1	mile per hr.	
Ordinary, "	3	"	2	"	
Rapid, "	5	"	3	"	
Very Rapid,"	8	"	5	"	
Torrent,	9 or more	"	6	"	

14. When using hand spikes, avoid placing more than two men at one spike. See that the fulcrum is stable before bearing down, or time will be lost. Do not allow men to put their shoulders under a lever while lifting, or their chins and heads over it when bearing down.

In raising a heavy gun on skidding, do not allow its axis to slope more than 3°, or the gun may rush to the front or rear.

15. In uncoiling a new coil of rope, pass the end at the core to the opposite side and draw it out; the turns of the rope will then run out without kinking.

16. When using the howitzer or any gun on wheels, in the mountains, great care should be taken to have the wheels on the same horizontal while firing.

The deflection caused by one wheel being higher than the other $= R$ tan. a. tan. b, in which $R =$ range, $a =$ elevation and $b =$ the angle of the trunnions with the horizon.

17. The following table shows the weights of certain woods:

Willow weighs about		25 lbs.	per cubic ft.
Poplar	"	24	"
Fir	"	32	"
Elm	"	36	"
Sycamore	"	37	"
Pine	"	40	"
Beech	"	43	"
Ash	"	47	"
Oak	"	54	"

When green, the weight is about one-fourth more.

To find the weight of a tree, calculate its contents in cubic feet, and multiply the result by the weight of one cubic foot of the wood.

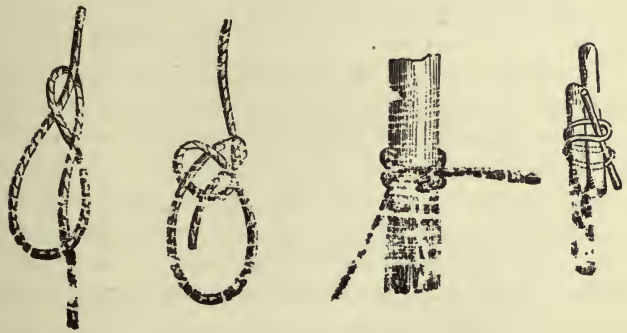
18. Opera glasses are invaluable as night glasses. With most persons they nearly double the limit of vision, and enable their eyesight to compare favorably with that of the night-roving animals.

19. The glittering of the sun upon the arms of distant troops indicates the direction of their march. If the rays seem perpendicular and constant, they are moving toward you; if slanting to the right and downwards, they are moving to your right; if the rays are varied and intermittent, they are moving away from you.

Dust raised by infantry forms a dense low cloud, while that raised by cavalry forms a higher and lighter one.

20. All soldiers should practice making the simple and important knots; a knowledge of their uses and being able to make them are essential in nearly all makeshift appliances.

The most elementary ones are the *timber hitch*, the *bowline* and the *clove hitch*.



The drawing shows these knots, also a simple form of tourniquet. A single or double band encloses the two pieces it is desired to lash together. A stick is then placed in the band and forcibly twisted around.

For a more complete description of knots, see page 114.

21. By means of the *clove hitch*, clothes or other articles are tied to tent poles when jointed, notched or at all uneven.

The illustration shows the method. The clothing, bags, etc., are hung upon the button at the end of the rope.

22. The following seems a good disposition of the rifle at night, when wishing to avoid its misplacement and prevent sneaking savages from stealing it.

'When getting sleepy you return your rifle between your legs, roll over and go to sleep. Some people may think this a

queer place for a rifle; but, on the contrary, it is the position of all others where utility and comfort are most combined. The butt rests on the arm, and serves as a pillow for the head; the muzzle points between the knees and the arms encircle the lock and breech, so that you have a smooth pillow, and are always prepared to start up armed at a moment's notice.' (Parkyns' 'Abyssinia.') The stock may be raised up and supported, if desired, to avoid any unpleasant pressure on the arm. The longer the gun the better.

23. It is very important to have all Government horses distinctly branded 'U. S.' immediately upon purchase. Many frontier horse thieves acquire considerable skill in changing these letters, by means of additions, so as to conform to certain legal brands.

A clear wood or charcoal fire is best for heating the branding iron, and it should be heated hot enough to thoroughly singe the skin without burning it. To effectually brand, the roots of the hair should be destroyed by burning.

It is readily seen how, by additions, etc., the U. S. may be converted into J. S., O. S., etc.

24. When you wish to roll up your shirt sleeves, do not turn the cuffs inside out, but turn them inward and roll up the sleeves, inward to the arm. By following this plan the sleeves will remain tucked up, without being touched, while if they be rolled outward they become loose every few minutes.

25. To determine the time of march (T) of a column:

Let D = the distance (in feet) to be passed over; L = the length of the column in feet; D^1 = the distance (in feet) passed over in one minute by the column, including halts, and T^1 = the time of delay (in minutes) due to the elongation of the column in passing defiles, the physical condition of the command and the irregularities of the route; then, $\frac{L}{D^1}$ = the time (in

minutes) for the column to pass over a distance equal to its length, and T (in minutes) =

$$T^1 + \frac{L}{D^1} + \frac{D}{D^1} = \frac{D^1 T^1 + L + D}{D^1}$$

Thus, for a column of troops 860 feet in depth, moving at the rate of 100 yards per minute (including halts) and delayed eleven minutes, to pass over six miles,

$$T = \frac{300 \times 11 + 860 + 31680}{300} = 119\tfrac{14}{15} \text{ m.} = 1 \text{ h. } 59.47 \text{ m.}$$

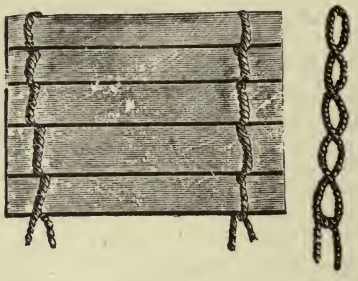
26. To facilitate the climbing of a large tree with rough bark, unite the feet by dampened handkerchiefs, towels, or raveled ropes tied together (avoiding a round rope) so that their distance apart shall be about $\frac{2}{3}$ of the diameter of the tree. Every time that the body and arms are raised in climbing, press the connecting rope or substance against the bark with the feet. The roughness of the bark and the oblique pressure against the trunk of the tree will prevent the rope from slipping down.

27. To calculate the distance of an enemy's gun, count the beats of the pulse (the average pulse beats at the rate of seventy-five in a minute) between the moment of the flash and the sound of the report by 300—the result will be the distance in yards. If a watch be handy, the same distance, nearly, may be determined by multiplying the number of seconds between the flash and report by 365.

The numbers 300 and 365 are taken because easily memorized and giving results sufficiently correct for practical purposes.

28. In the following drawing is represented the Malay hitch. I would urge that all soldiers and travelers become familiar with it, and learn how, by its means, to attach together wisps of grass, straw, reeds, poles, laths, planks, etc., and form flexi-

ble mattings. Innumerable articles, from a boat-sail to the roof of a house, may be thus constructed.



The great advantage of the Malay hitch is that when no longer required, the structure may be shaken to pieces, leaving neither holes or imperfections in the material nor kinks or knots in the rope.

29. To dig for water without spade or shovel, proceed as follows in a soil free from rocks:

Take a bamboo or pole from six to fifteen feet long and two or three inches in diameter, and split the larger and lower end into ten or twelve pieces. Tear away the grass and work the pole up and down vertically. The soil soon works its way up into the splits of the pole, which is then withdrawn. After shaking the earth out, it is again introduced into the soil and used as before. Small holes eight or ten feet deep may be made in this way.

30. To procure water for the stock when it is inaccessible by reason of precipices, etc.:

If in a forest where poles are at hand, and the water is not to be raised more than fifteen feet, take a long pole and cause it to act as a lever over a rock or limb, a bucket being attached to the long arm so as to reach the water, and a heavy stone or rock to the short one.

If the water is to be raised many feet, take a long rope, or connect the lariats, and fasten the bucket to one end; make the other end of the rope fast to a horse, after passing it over

a smooth log or rock, and have the horse driven over a certain calculated distance.

I have procured water, in this way, from the Salmon river when it was ninety-five feet below the camp.

31. If without matches, a spark may be obtained as follows:

1st. Take out the object glass of a telescope, if there be one, and use it as a burning glass. The inside of a highly polished watch case might answer.

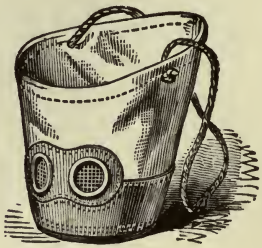
2d. Try the Indian method of producing fire by the friction of two pieces of wood, called the drill stick and the fire-block. Any hard and dry stick will do for the former, but the latter must be an inflammable wood, with a medium softness and little grain. A walnut gun stock is excellent. The drill stick is roundly pointed at the end and brought to bear upon the fire-block with pressure, while it is rapidly revolved by means of the hands or a string passing around it.

A little powdered charcoal sprinkled on the fire-block (which may be scraped off the trees in most any section where forest fires have raged) will greatly assist in the production of the spark.

3d. By means of a flint and steel. The flint may be replaced by silicious stones—quartz, agate, jaspar, etc., or even by granite. Crockery will often make a good spark. If there be no steel at hand, a link of chain, a piece of a bit or horse shoe may be case-hardened and used. Pyrites is frequently employed.

32. When it is necessary to use *feed bags* on the stock in consequence of mud, sand, water, etc., it is all important to provide some means of ventilation. I have seen horses suffer intensely when their noses were confined in a close feed bag, so that the jaws could not be opened without compressing the nostrils so as to prevent the ingress of sufficient air, and this for nearly an hour.

The drawing represents Boyle's ventilated nose bag, which in every respect is excellent.



33. When traveling with a wagon train and attacked by Indians, if practicable, make the following plan of defense: Hasten to the nearest water and place one wagon, containing the sick and the ammunition, near it. With this as a center, form, as nearly as possible, the other wagons in a circle about it, so that each inner fore wheel shall nearly touch the outer hind wheel of the wagon preceding, the poles extending outward. Place the men and stock inside the circle, lock the wagons by means of drag or other chains, and throw up earth, rocks, logs or bushes under them. When desirable, by moving a single wagon slightly forward, the stock may be led out and hitched without confusion.

34. To secure a prisoner with the minimum amount of string, bring his hands behind him, back to back, and tightly tie the thumbs together, also the little fingers. In the absence of strings, a strip torn from the linen will suffice.

In darkness, or when the prisoner might escape by running, it is well to pass his arms around a standing tree or tent pole before tying his hands.

Several prisoners are made fast to a pole or rope, behind one another.

If the prisoner is to be mounted, see that he is made fast to the saddle or girth on the horse ridden by the guard (the off

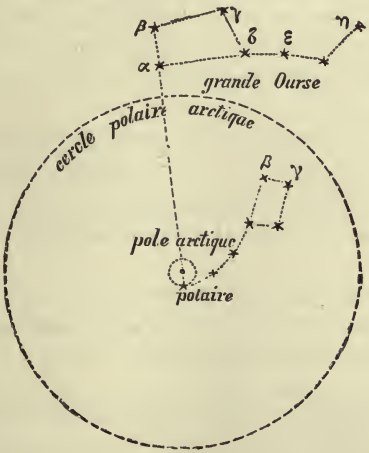
stirrup may be used in absence of any other fastening), and that his ankles are strapped together under the horse's belly.

35. To trace a right angle on the ground, take a rope twelve feet long and mark distances of three and four feet from the ends, respectively. Peg the central section of five feet to the ground and bring the two ends of the rope to a point on the ground, and thus form a right angle. Any multiple of twelve feet may be used for convenience, since any triangle whose sides are in the proportion of three, four and five, is right angled.

36. A scale of equal parts may be made by folding a slip of paper in half, then folding each part in half, and so on.

The diagonal fold of a sheet of paper with a square corner makes an angle of 45°, or four points of the compass. This again diagonally folded will give $22\frac{1}{2}$°, or two points of the compass, and so on.

37. The meridian may be determined at night by passing a plane through a plumb-line and the north star.



The trace of this plane on a horizontal plane will be the projection of the meridian sought, the north star being only $1\frac{1}{2}$° from the true pole.

It is easy to recognize the north star—it is the seventh star of the little bear and is found precisely in the prolongation of the two first stars of the great bear (*grande ourse*), a constellation disposed in symmetrical order as in the drawing. (*Aide Memoire d'Etat Major.*)

To practically determine the variation of the compass, erect a pole, and at a distance of 200 yards set up another, so that the two are in a line with the true north; the variation of the compass may be ascertained the next morning by taking the bearing of one pole from the other.

38. In a triangular pile of spherical shot, $S = \frac{n(n+1)(n+2)}{1.2.3}$; in a square pile, $S = \frac{n(n+1)(2n+1)}{1.2.3}$; in a rectangular pile, $S = \frac{n(n+1)(2n+3m+1)}{1.2.3}$; where S = number of shots, n = number of courses, and m = difference between the number in the length and the number in the breadth of the base course.

The triangular and square piles terminate each in a single ball.

The number of balls in a triangular face is found by multiplying half the number in the breadth at the base by the number in the breadth at the base plus one.

In all piles, the breadth at the bottom is equal to the number of courses.

In an oblong pile, the top row is one more than the difference between the length and breadth of the bottom.

In the case of Armstrong shot or shell, $S = (2n + r - 1)\frac{mr}{2}$; where n = the number in the length of the top course, r = the number of courses, and m = the number in the breadth.

39. Ink, in an emergency, may be made by rubbing charcoal,

gunpowder or soot into a little milk or warm water, to which is added a small quantity of gum or glue. Very strong coffee will make a fair ink that will not rub.

40. The working loads of hemp ropes are about as follows:

Circumference of rope in inches.	Working load.
1	1¼ cwt.
1½	4 "
2	7 "
2½	11 "
3	16 "
3½	1 ton and 1 "
4	1 " " 8½ "
4½	1 " " 16 "
5	2 " " 4½ "

The breaking weight (in tons) of hemp rope is $C^2 \times 28$, and its weight (per fathom) is $\frac{C^2}{4}$, C being the circumference of the rope expressed in inches.

The working loads of ordinary chains are as follows:

Diameter of link.	Weight per fathom.	Working load.
$\frac{5}{16}$ inch	5½ lbs.	0.7 tons.
$\frac{3}{8}$ "	8 "	1.0 "
$\frac{1}{2}$ "	14 "	1.7 "
$\frac{5}{8}$ "	22 "	2.8 "
$\frac{3}{4}$ "	32 "	4.0 "
$\frac{7}{8}$ "	43 "	5.5 "
1 "	56 "	7.0 "

Chains are heavier than ropes, for a given strength, in the proportion of seven to two.

A stay across the link of a chain increases its strength about one-sixth.

41. The following are good make-shift candlesticks: A bayonet stuck into the ground; an empty bottle; a hollow bone; a nail driven through a board and projecting upward; a hole cut into the ground, or into a potato, slice of bread, etc.

42. The formula for finding the weight of animals, in pounds,

is (G × .08) L × 42; in which, G is the girth in feet, taken close behind the shoulder, and L is the distance in feet from the fore part of the shoulder blade to the bone of the tail.

For cattle, fifty per cent. should be allowed for skin, offal, head, etc.; about forty-five per cent. for sheep; and twenty-five per cent. for swine.

43. In the case of beams supporting weights over ditches, ravines, etc.; if the depth of the beam be doubled, other things equal, its strength will be increased four times; if its breadth be doubled, other things equal, its strength will be doubled.

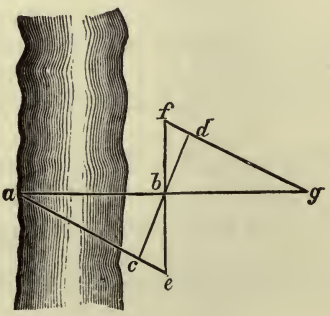
By increasing the distance between the supports, the strength of the beam is decreased in the same ratio. Half the distance between the supports will enable the beam to bear twice the load.

Place a prop or skid under the center of the beam, when possible. If instead of concentrating the load at the center of the beam, it be equally distributed over it, the beam will bear twice the load.

The effect of the load on a beam will decrease in the ratio of its proximity to the support. A beam fixed at one end and loaded at the other will bear one-half the weight of the same when supported at each end.

The strength of round timber is about one-half of that of square timber, whose side = the diameter of the round timber.

44. To measure the breadth of a river without instruments and without crossing it:



1st. Assume *dc* in any direction, and make $bc = bd$ (*ab* being as nearly perpendicular to the banks as practicable); then, locating *e* on *ac* produced, make $bf = be$; join *f* and *d* and prolong *fd* to *ab* at *g*; then $bg = ab$.

2d. Produce *be* until the angle $bea = 45°$; then, $be = ab$.

3d. Without reference to figure, the following methods may be used according to the location of the distance to be measured with respect to the surrounding country.

a. Let AB = the distance to be measured. Produce AB to any point, D, and bisect BD in C. Through D, draw D*a*, making any angle with DA, and take D*c* and D*b* = DC and DB, respectively. Join B*c*, C*b* and A*b*. Through E, the intersection of B*c* and C*b*, draw DEF, meeting A*b* in F. Join BF, which being produced will meet D*a* in *a*; then $ab = AB$.

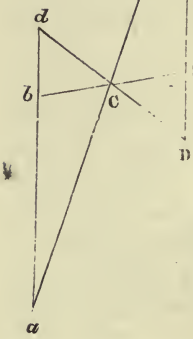
b. From any point, C, draw any line *c*C and bisect it in D; take any point, E, in the prolongation of AC and draw the line E*e*, making D*e* = DE. In like manner take any point, F, in the prolongation of BC, and make D*f* = DF. Produce AD and *ec* till they meet in *b*; then $Ab = AB$.

c. At any point, E, in AB drop a perpendicular and on it make E*b* = 50 feet, and EF = 60 feet. Trace a line through F perpendicular to EF. Then plant pickets at M and N, so that M, G and B will be in the same right line; as also the points N, G and A. Measure the distance (*d*) between M and N, then the distance required equals 5 *d*.

4th. An impassable distance may be determined by firing a bullet at a well defined mark at the further end of the distance, with the sight adjusted to the estimated distance, and noticing whether the bullet falls short or passes beyond the mark.

It might also be well to remember that sound travels one statute mile in about $4\frac{3}{4}$ seconds, and one geographical mile in about $5\frac{1}{4}$ seconds.

5th. To measure AB, prolong it any distance to D; from D, in any direction, take equal distances, DC and C*d*, and produce



BC to *b*, making C*b* = CB; join *db* and produce it to *a*, where AC produced intersects it; then, *ab* = AB.

Or proceed as follows: Lay off any convenient distance, BC, perpendicular to AB; make CD perpendicular to AC, and note the point D, where it intersects AB produced; measure BD; then, $AB = \frac{BC^2}{BD}$

45. To determine the height of a tree:

1st. By means of its shadow. Plant a vertical measured staff (L) and measure the length of its shadow (S) upon a horizontal ground; measure also the length (l) of the shadow of the object whose height is to be determined; then,

$$\text{height of the object} = \frac{L \times l}{S}$$

2d. Plant a vertical staff (equal in length to the height of the observer's eye) at such distance from the foot of the required height that the observer, lying upon his back with his feet against the bottom of the staff, is in the same line. Then, the height of the object = the distance from the eye to its base.

3d. Plant two vertical staves L and L^1 feet in length, on the horizontal plane through the base of the object, so that their tops and the top of the object, whose height is required, are in the same right line. Measure the distances D and D^1 between the staves and between L and the base of the object.

$$\text{Then, the height} = \frac{L \times D^1 \times (L^1 - L)}{D}$$

4th. If you have a looking-glass, place it upon the ground and level it by placing a cup full of water upon it; retire until the top of the object is seen reflected in it. Then, the height

of the object equals the height of the eye above the mirror, multiplied by the distance of mirror from the object divided by the distance of mirror from the observer.

These methods apply only to such objects as trees, walls, precipices, etc., where the highest point is vertically above the accessible base. Still, when the base is not accessible, its distance may be readily calculated, as shown in paragraph 44.

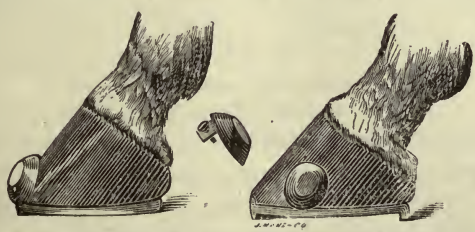
To determine the height of a mountain by means of a thermometer: Let T = the temperature of boiling water at any station, deducted from 212°; and H = the height, in feet, of the station above the sea. Boil some water and ascertain T by means of the thermometer; then, $H = 520\,T + T^2$.

To determine its height by means of a barometer and thermometer: Observe the altitudes A and A^1 of the mercurial column in inches and fractions of an inch, at the base and summit of the mountain. Also, note the mean of the readings of the thermometer (Fahrenheit) at the times of the barometrical observations. Then, height of mountain (in feet) =

$$55{,}000 \times \frac{A - A^1}{AA^1}$$

For a mean temperature of 55° Fahrenheit, augment or diminish this result by its $\frac{1}{440}$ part taken as many times as there is a difference (in degrees) between the mean readings noted and 55°. The determined height, when not greater than 2,000 feet, will be very accurate.

46. The "Toe and Side Weights" shown in the drawing are



excellent for all horses that knee-knock, hitch, click, interfere,

or single foot. They are entirely metallic, without straps or buckles, and are held on the foot by small steel screws, which pass through the shoe and into the spurs on the weights. A few should be taken on every journey with stock.

47. The weight (in pounds) of an iron shot = the diameter cubed $\times \frac{9}{64}$; the weight (in pounds) of a leaden shot = the diameter cubed $\times \frac{8}{114}$; the diameter (in inches) of an iron shot = (the cube root of the weight) $\times$ 1.923; the diameter (in inches) of a leaden shot = the cube root of $4\frac{1}{8}$ times the weight.

The weight (in pounds) of an iron shell = $\frac{9}{64}$ $\times$ (the difference of the cubes of the external and internal diameters).

The weight of powder (in pounds) contained in a shell equals

$$\frac{\text{the cube (in inches) of the interior diameter}}{57.3}$$

The weight of powder (in pounds) required to fill a box equals the continued product

$$\frac{\text{of the inches in the length, breadth and depth}}{30}$$

If the powder is not shaken, divide by 31.4182 instead of 30.

The weight of powder (in pounds) to fill a cylinder equals

$$\frac{\text{the length (in inches)} \times \text{square of the diameter}}{38.2}$$

The diameter, in inches, of a shell to contain a weight of powder = (the cube root of the number of pounds) $\times$ 57.3.

The length of the bore of a gun (in inches) filled by n pounds of powder equals

$$\frac{n \times 38.2}{\text{square of the diameter of bore}}$$

48. It is important to learn how to use the lasso. It consists of a very strong thin plaited rope made of raw hide. One end is attached to the saddle, the other end forms a noose. When going to use it, the rider keeps a small coil in his bridle hand, and in the other holds the running noose, having a diameter

from 3 to 8 feet; this he whirls around his head, and by a dexterous movement of the wrist keeps the noose open; then, throwing it, he causes it to fall over the head of the animal.

49. At 30 yards, a person with ordinary sight can distinguish the white of the eye; at 80 yards, the eyes can be seen; at 100 yards, the body and movements of same can be seen and the buttons counted; at 200 yards, the buttons look like faint stripes; at 300 yards, the features of the face are distinguishable; at 400 yards, the face appears like a dot, and the movements of the legs and arms are distinct; at 500 yards, the head is visible; at 600 yards, individual movements are observed, but details disappear; at 700 yards, the movements of the legs and arms become indistinct; at 800 yards, individual movements cannot be observed; at 900 yards, the head appears like a dot; at 1,000 yards, a line of men appear like a broad ragged line; at 2,000 yards, infantry presents a thick line with a bright one above it, cavalry a thicker one with an uneven top and a single man or horse looks like a dot.

The sun on your back, or looking over a light surface, such as water or snow, tends to make objects look near; while with the sun in your face, or looking over a dark background or undulating surface, has the contrary effect.

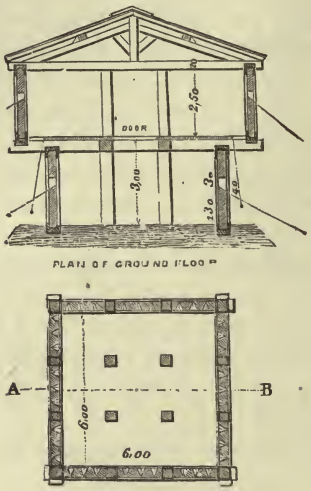
50. To prevent a mule from braying, when silence is necessary in a hostile country, tie a heavy rock to his tail. A mule invariably elevates his tail when he wishes to bray, and if this be heavily weighted down, an end is put to one of the greatest of nuisances.

The Indians cruelly avoid such noises by so placing a needle that it will prick the mule whenever he endeavors to open his jaws.

51. The Block House is a useful defense against Indians in a mountainous country, where the surrounding heights cannot be held.

They are usually placed at the two diagonal corners of a picket work. Its plan should have re-entering angles, or be in

the form of a cross, so that the faces may be defended by flank fires. When used against Indians, without artillery, square logs, laid on each other, replace the usual double row of piles.



The height of each story should be about ten feet, the upper one projecting all around and serving as a machicoulis. The roof should have a layer of earth or sand upon it, as a guard against fire, and escapes should be provided in it for the smoke. All trees and bushes, within range, that would afford cover, should be removed, if possible.

52. All travelers should endeavor to be 'weather wise,' and a small aneroid barometer should be carried and frequently observed.

A change of the moon greatly influences the weather. A halo around the moon indicates approaching wet weather; the greater the circle the nearer the rain. It is generally believed that 'the third day before the new moon regulates the weather on each quarter-day of that lunation, and also characterizes the

general aspect of the whole period. Thus, if the new moon happened on the 26th of May the term day was the 24th; the weather of that day was to be that of the 26th and the 3d, 11th and 19th of June, the quarter-days, respectively.'

Fine weather may be expected when swallows fly high; but when they or any birds of long flight hang about home or fly up and down or low, rain and wind may be expected. When the stock seek sheltered places and do not cover their usual range, when smoke does not ascend readily during a calm, an unfavorable change must be expected.

Dew and fog are indications of fine weather—neither occurs under an overcast sky, or when the wind is blowing.

A constant study of the heavenly phenomena will enable anyone to know what sort of sky precedes a storm or fair weather.

CHAPTER V.

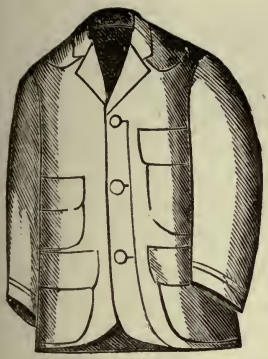
Equipage and Supplies.

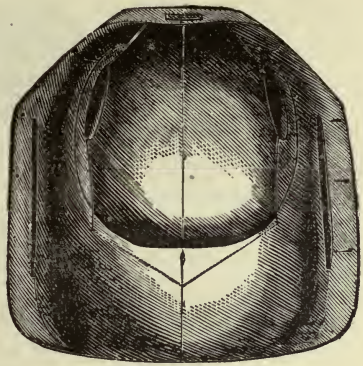
When a regular command is ordered into the field, the commanding officer should use his own discretion in designating the equipage, supplies and individual outfits to be taken. The following observations may, however, be useful, when with a view to comfort and efficiency, certain deviations from the general regulations are permitted.

CLOTHING.

The importance of flannel (or cotton in its absence,) next to the skin cannot be overrated. Both shirt and drawers should be made of well shrunken material of good quality and unobtrusive color. The shirts should be supplied with turn-down collars and breast pockets, which are very convenient for holding a variety of small articles when no waistcoat is worn. Long woolen stockings, to be worn with shoes and over the bottoms of the pants should also be taken. The Government woolen sock is excellent, but in a locality where the ground is very hot, I prefer something still thicker. For the coat and waistcoat, nothing can surpass the Goodyear garments. A waterproof or canvas blouse, cut sufficiently short to clear the saddle and provided with numerous convenient pockets, will be useful and handy on all occasions.

The drawings show the outside and inside finish of a convenient pattern.





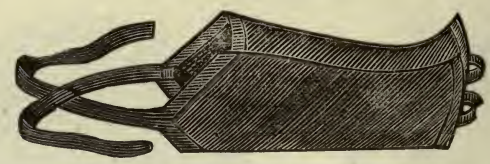
The waistcoat, generally worn without the coat, should be cut rather long, have several pockets and, by means of bands tacked on it, be made to carry, like a cartridge belt, about twenty cartridges.

The pants should be constructed of thick woolen material, reinforced on the inside where they touch the saddle, with soft buckskin or leather. They may be greatly protected by wearing a light pair of overalls. There should be no hem at the bottoms of the legs, as the dampness is thus retained for a long time.

In the selection of all outer clothing some attention should be paid to color. Gray, buff, or neutral tints not only absorb but little heat in very warm weather, but are the least conspicuous.

A soft and dark felt hat, with a moderately wide brim, is the best headdress. A pair of warm mittens and a pair of stout driving gloves, with buckskin put in between the fingers, will suffice for the hand covering. A few silk or cotton handkerchiefs for neckwear are indispensable.

As a general thing, when on a rugged trail, boots rapidly impair the soundness of the feet, and are most judiciously replaced by flexible low-cut shoes, covered with buckskin leggings, of the style represented, or worn with long



woolen stockings containing the bottoms of the pants, so as to protect from the sun, dust, snake bites, etc.

If boots must be worn, considering comfort and economy, I know no pattern preferable to the Government B. S. boots. They should be selected about one size too large and so as to come well up to the knee and fit the leg compactly, after admitting the bottoms of the pants. They should have broad soles and low heels, and be sufficiently flexible to allow the wearer to walk with freedom.

When traveling through snows, light moccasins covering two pairs of woolen socks, are excellent. The Indians wear the lightest possible moccasin on all occasions, probably because of comfort and the custom of creeping up on game without any noise.

I have often found comfort in a dressing gown while in the field. Such a garment is a relief when put on after making camp, or when around the campfire, and serves as a warm extra dress in which to sleep. A pair of old slippers is another luxury in the camp.

THE TOILET.

It is a well known fact that dirt and grease protect the skin against inclement weather. An Indian will seldom wash unless he can grease himself afterwards—and with him, in many instances, grease takes the place of clothing.

We can readily see the necessity of an equality of the activity of the skin and the calls upon it, and why, when exposure is very great, the pores should be defended.

No very extensive preparation is necessary in this part of the outfit, but the traveler should see that he has his tooth brush, comb and brush, a few towels, both large and small, and soap, all placed in a water-proof wrapper or traveling-

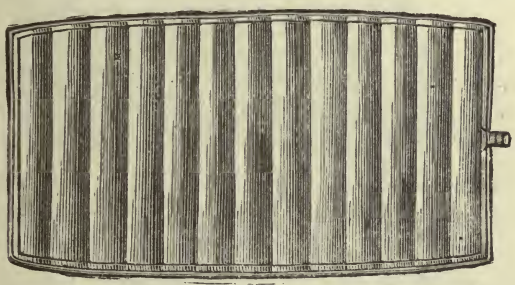
case made for the occasion. This part of the outfit should be transported upon the saddle, in the saddle bags or in the clothing bag in order tnat the articles may be convenient for use upon arriving in camp. The soap may be nicely kept and preserved in a suitable tin box.

I do not think it well, in rough travel, to wash in the early part of a dark wintry morning. The best time is after the morning's ride or march, or after making an early camp.

BEDDING.

It is absurd for a soldier to take a mattress in the field, even on a short journey. A buffalo robe and three blankets, or even the blankets, poncho and the allowance of canvas, will, if properly placed, make a most inviting bed.

I have used with great satisfaction what is known as the

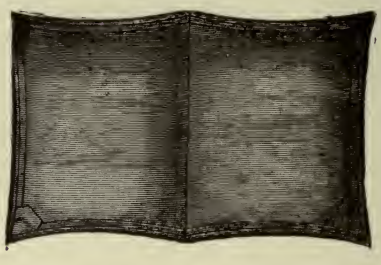


water bed. It is made of strong, light rubber. When not in use, it may be wrapped about the clothing bag, inside the outer canvas covering, and will form a waterproof protection for its contents. When required for use, it is filled with water and placed upon the ground or bed.

The water pillow is another invaluable article of similar use and construction. When being transported this may be wrapt about official papers and will prove a good protection for them in case the pack should, by accident, go under the water.

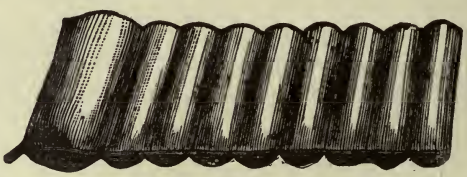
When preparing the pillow for use, it is easily filled with

air exhaled from the body and is made to assume any de-



gree of softness by varying its contents of air.

In many camps water is a scarce article, and in order to be on the safe side, I would recommend an air bed and pillow, and for convenience would have them combined in one.



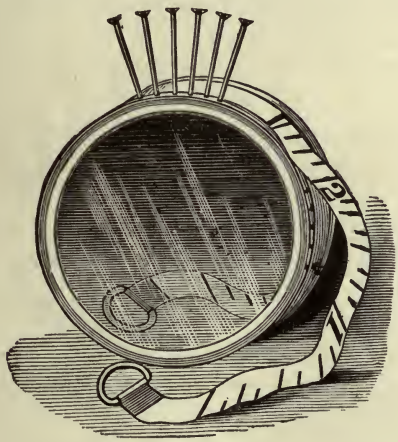
In addition to the clothing and bedding, it is a good plan to have a small satchel or sort of 'ditty bag' accompany the personal outfit. It should contain thread, needles, wax, a roll of tape, a ball of twine, a few buttons of all sorts, a paper of pins, a bodkin, a thimble, a pair of scissors, a few shoestrings, a small awl or sail needle and some buckskin.

The provision of a suitable quantity of reading matter and writing materials should never be neglected.

The drawing shows an ingenious contrivance for fasten-

ing on buttons which is of great use in the field. A few of these fasteners may be carried in the vest or hip pocket, and a button lost while on the march may be easily replaced.

Before leaving the settlements, each man should provide some means of exactly measuring feet and inches. It is well to mark a scale of inches on something sure to be at hand, for instance on the gun-stock or inside the belt. I would recommend that every man know his height, the full stretch of his extended arms, the exact height of his eye above the ground when standing and when kneeling, his cubit, the length of his foot, the width of his fingers and the exact amount contained in his cup or canteen. Some of these will daily prove a convenient unit of measurement.



The small combination mirror, pin cushion and tape measure here represented is very useful, may easily be transported in the pocket and will be called into frequent requisition.

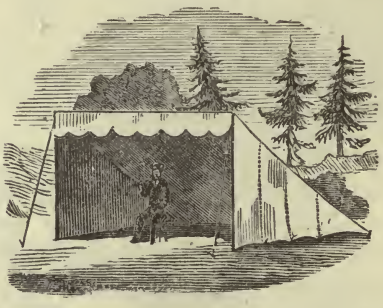
The clothing, bedding and personal effects are usually rolled tightly and tied up in the tent or canvas when prepared for transportation. Most frequently a modification

of the Tente d' Abri of the French, is furnished our scouting columns in the field and is well suited for such work; but, when there is left any choice or selection in the matter of canvas, it may be very much improved upon.

In selecting the tent, one should consider its lightness, its capability of being quickly pitched (and in different ways depending upon the climate and the facilities for securing poles,) its ventilation, its capability of neatly enclosing the bundle and serving as a waterproof covering for the bed when not pitched, but merely wrapped about it

It is believed that the author's Combination Shelter, Storm and Common Tent better meets the requirements of the tentage, to be used in all climates and independently of the transportation, than any other that has been tested.

The tent may be made on a large scale and will well re-



place the present form of Hospital Tent, affording a maximum available sheltered space for the minimum amount of canvas and will admit of being combined so as to form a single shelter for any number of men, standing either high or low. This combination tent (service size) and its capabilities will be noticed at length in the chapter 'Forced Marches.'

The French Officers' Tent, here represented, is a very satisfactory one so far as room and lightness are concerned,

but it possesses the disadvantages of numerous pegs and guy ropes and not being suitable for wrapping about the bundle.

Every man, on going into the field should take an extra lariat, as one will generally wear out during a long journey, and besides, they will be found very useful in making the bundles secure and in crossing deep streams, etc. If the transportation will admit of it, a coil of half-inch rope should also be taken.

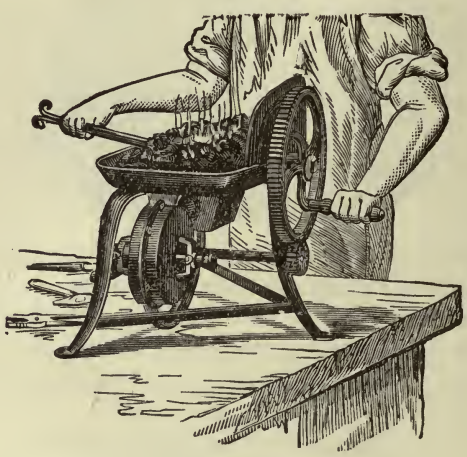
A few extra locks, screws, springs, tumblers, etc., should be taken along, in order to keep the arms in thorough repair.

A sufficient number of spades and axes (a few hatchets never come amiss) should be packed with the equipage. A small hand saw, a rasp, a few gimlets, brad-awls, saddler's awls, nails, screws and coils of wire packed closely in a small chest or canvas roll will be found well worth the transportation and frequently useful.

A good hunting knife is indispensable, and I know nothing more valuable in this connection than the trowel bayonet of Colonel Rice (one edge kept sharp.) While invaluable as an intrenching tool, the soldier soon learns to use it as a knife, a hatchet, a spade and chopping axe.

A proper supply of horse and mule shoes and nails should be carefully provided. They should be transported in several small leather or canvas sacks, each furnished with a hammer, rasp and pincers, which will become very handy in case the command is divided into detachments.

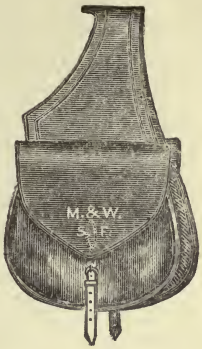
The value and importance of a portable forge cannot be overestimated. The drawing represents a convenient form.



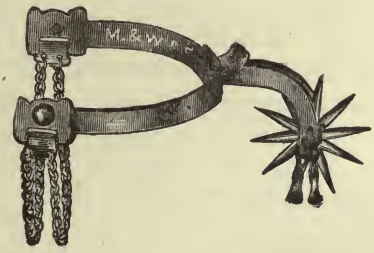
It is very simple in its construction, gives a strong and steady blast, with but little labor, and its dimensions are such that it may be easily packed in a cracker box and form a very handy side or top pack for the pack mule. This forge is twelve inches by seventeen inches and fifteen inches in height, has a seven inch fan, and weighs a little less than fifty pounds. In case there be no forge or no facilities for shoeing the animals, it will be well to provide a few sandals like represented in the drawing, to be used in case a horse loses his shoe and cannot be reshod at once.

Sufficient has been already said in connection with the horse equipment; but make sure that the saddle is sufficiently roomy, well padded and without hem or edging.

A pair of light saddle bags should always accompany the saddle. The drawing represents a very suitable style, manufactured especially for scouting purposes, and furnished with a small assortment of instruments and necessities for the march.



The smaller the spurs the better, unless the animal is very lazy; then, a pair of substantial Mexican spurs, with wide straps, will be found the most satisfactory kind of 'persuader.'



It is a good rule to leave behind all notions of snaffles and double reins, and to ride with nothing but an easy curb. A temporary but not desirable substitute for the curb may be made by noosing a string, and putting the noose around the horse's lower jaw.

Have no more buckles in the equipment than are absolutely needed. Nothing tends to weaken a bridle or strap so much during exposure as the rusting out of buckles and the pulling through of their tongues. Both are sources of endless annoyance.

The ration, as established for the U. S. Army, is composed of twelve ounces of pork or bacon, or one pound and four ounces of salt or fresh beef ; one pound and two ounces of soft bread or flour, or one pound of hard bread, or one pound and four ounces of corn meal. To every one hundred

rations, fifteen pounds of beans or peas, or ten pounds of rice or hominy; ten pounds of green coffee or eight pounds of roasted (or roasted and ground) coffee, or one pound and eight ounces of tea; fifteen pounds of sugar; four quarts of vinegar; one pound and four ounces of adamantine or star candles; four pounds of soap; three pounds and twelve ounces of salt; four ounces of pepper; thirty pounds of potatoes (when practicable) and one quart of molasses.

Citric Acid may be easily transported, and when mixed with sugar and water, makes a very refreshing drink and an excellent antiscorputic. A small supply should always accompany the rations.

Beans, peas, salt and potatoes (fresh) are to be purchased by weight sixty pounds to the bushel. Desiccated compressed vegetables may be substituted for beans, peas, rice, hominy or fresh potatoes at the rate of one ounce to the ration.

One ration, consisting of ½ pork, ¼ salt beef, ¼ bacon; ½ flour, ½ bread, in boxes; beans or peas; rice or hominy; ¾ roasted and ground coffee, ¼ tea; sugar, vinegar, adamantine candles, soap, salt, pepper, molasses and potatoes, weighs 3.0311 pounds net.

One ration, consisting of ½ pork, ¼ salt beef, ¼ bacon; bread in boxes, beans or peas; rice or hominy; ¾ roasted and ground coffee, ¼ tea, sugar, vinegar, adamantine candles, soap, salt, pepper and molasses, weighs 2.5436 pounds net.

It is not advisable to transport pork on pack mules, as it soon becomes dried by the sun, and much of the fat is melted out. A succulent fifty pound pack, after a few weeks' transportation, will dwindle away to a hard chunk of fifteen or twenty pounds.

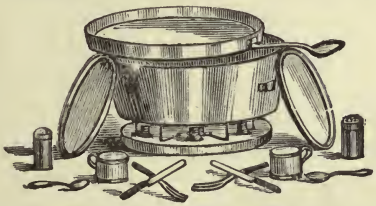
The number of rations to be carried will depend upon the size of the party, the extent of the journey, the possibility of procuring rations, and the amount of game that can be se-

cured by the hunting detachment. It is a golden rule to set out with the mules lightly loaded, and an excellent plan to discreetly *cache* a portion of the supplies when there is a certainty of at least a part of the command retracing the 'trail.'

In connection with packing and transportation, it will be useful to remember the following measurements and capacities:

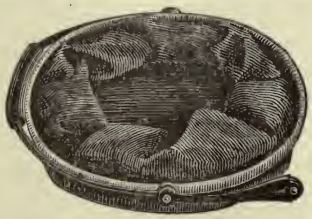
A box	4 in. by	4 in. by	3.6 in.	will hold about	1 qt.
"	5 in. by	5 in. by	5 in.	" "	2 qts.
"	8 in. by	8.4 in. by	8 in.	" "	1 pk.
"	24 in. by	16 in. by	28 in.	" "	1 bbl.

The messing outfit will be noticed in the chapter 'The Mess;' but make sure that the cooking implements and table necessaries are so selected as to nest compactly. The camp kettles may enclose the dishpans, and these the skillets and smaller articles. It is best with a view to packing to have the skillets, fryingpans, etc., so constructed that a spoon



may be applied as a handle, and removed when not in use or when packed. The drawing shows the idea.

The buckets should be made of rubber or canvas, and



should be constructed with folding frames, as shown in the drawing. Such buckets will sustain great pressure without giving, and when folded for transportation will occupy an exceedingly small space.

CHAPTER VI.

Mountain Travel.

A good mountaineer is usually guided by the same instinct that carries the bee to its hive. By day he uses the sun and the prominent landmarks ; while in his night marches, the stars may serve to give the direction. Polaris and Ursa Major, or the Southern Cross, give the north and south bearing, while the Zodiacal stars indicate the east and west points. It is seldom that the ordinary traveler, even when provided with compass, sextant and chronometer and after careful practice and cultivation, becomes skilled in mountain craft.

In a mountainous country, where the routes of possible travel are few, a guide with a good local knowledge is very desirable ; for the compass is by no means sure when in the vicinity of granitic rocks (rich in hornblende and other iron bearing ores). Unless possessing a local knowledge of the country, guides are only useful when water and camping places are scarce and must be hunted and when messengers may be needed.

Before going into the mountains, if possible, a map should be secured, correctly showing the large streams, their general directions and important tributaries,—and the line of march and probable location of the camp should be noted on the map daily. It will not do to trust too much to the 'bump of locality,' but every 'sign' indicating direction should be carefully considered. In some latitudes the moss grows much thicker and stronger on the north side of the firs and pines, which fact may enable the traveler to direct his course through the forest in the absence of all other guides. Again, the ripples in the snow on the mountain tops often run in fixed directions, in consequence of constant winds, and these may serve as a guide.

In order to successfully travel the mountains, it is necessary to understand their complete make up and to know how to skillfully follow the *divides*. When the divide A E B

separates the waters of two streams not uniting with each other, as C and D in the drawing, it is known as a *principal divide*, and always affords the best route of travel.

The sides of canyons and ravines are frequently so precipitous that it is neither advisable nor possible to cross them ; and although it is sometimes easy traveling along the bottoms (the level land enclosed between the sides,) when not too narrow and rocky, the best route will, considing all things, be found along the divides. Such a route is frequently long and crooked, but it is a good one.

Suppose it be required to pass from the stream *C* to the stream *D*, parallel to it, but separated from it by very high and broken mountains.

To accomplish this most expeditiously, follow up the stream to *C*, where we will suppose a tributary of the stream puts in. Now if there be a good route, apparently, over the divide above this tributary, turn to the right and follow it, until the principal divide is reached at *E*. The route, if

practicable, may be taken along the bottom, should water be desirable, as far as necessary and then the divide *C E* may be taken. Having reached the principal divide, pass over it and descend by any suitable and practical divide as *E D*, leading from the principal divide, to the other stream. It will be found that all the divides lead to the principal divide, and hence there will be no doubt as to finding the principal divide; but it will often require good judgment in selecting the most practicable divide leading to it. It will be still more difficult to select the practicable divide in descending, as all appear more or less practicable from the summit. The innumerable *cul de sacs*, met with in descending, can only be avoided by exercising great caution. In every case the divide selected should separate tributary ravines of two *important* tributaries of the stream. It is seen in the drawing how these ravines frequently overlap each other and render the route very sinuous.

It is recommended to follow game trails, when discovered, in passing from one stream to another. They usually follow the most direct and practicable route over a fair divide. When arriving at the steep edge of a ridge, and where difficulty in finding a good trail is anticipated, it is a safe rule to descend first, on foot, and seek a trail for the command or train as you climb back again. It is much easier to make this selection while ascending than while descending; for when at the bottom of a hill, its bluffs and precipices face you, so that they may be readily avoided, but when at the top of the hill these parts are overlooked and not seen, until closely approached.

The investigation of ravines is the exact reverse of that of the divides; but localities are much more readily lost when the ravines proceed thence in various directions. On crossing a divide and coming upon a system of ravines leading to a different *principal ravine*, the traveler should make very sure of his course and frequently take the bearings of the most prominent landmarks.

A person may be readily lost in the mountains, and it is never safe to stray off from the camp or command when alone. Should necessity demand it, however, it will prove an excellent rule to take along the rifle and a good supply of ammunition and matches.

Observation goes to show that the horse and other animals, when running on an open ground, will gradually turn their courses to the *left.* The same is true of man, when lost on the prairies and cut off from all guiding marks or objects—and it is still more the case, when he is lost in the mountains, the irregularities of the route of travel seeming to confuse his ideas of direction and locality. This *turning to the left* is so rapid with the average lost man, that he will frequently travel in a circle and will, in the course of the day, arrive at the point left in the morning. It should be remembered that, when lost, it is best not to increase the perplexity of the matter by wandering still farther, but set to work to find the way back to known localities. Leave a broad trail for the relieving party to follow and make a great smoke, if possible.

The sense of desolation attending most *lost persons* is sufficiently overpowering to cause them to lose their presence of mind, to wander widely about and rapidly exhaust their vital powers.

Colonel Dodge relates the following remarkable account:

"When serving in Texas, a soldier of my company became lost while returning to the post from a small village two miles off. A party was sent out to search for him, and on the second or third day came upon him almost naked in a little thicket. As soon as he discovered the party, he bounded off like a deer and was pursued. After an exciting chase he climbed a tree, from which he was taken by force, and with the greatest difficulty—struggling, striking and biting like a wild animal. He was brought back to the post perfectly wild and crazy ; confined, watched and attended

with the greatest care for over a month before he recovered his mind. He was an excellent man, more than usually intelligent, but I doubt if he ever fully recovered from the shock. He recollected nothing but going a little distance off the road and getting turned around and realizing that he was lost."

When lost beyond all hope, when there are reasons to believe that a search will not be made, and when it is possible to keep alive for a few days, I believe it a good plan to make for the nearest large water course and follow it down by shore or raft, until the settlements are finally reached. But, before proceeding to this final course be sure that you have well endeavored to answer the following questions, viz.:

A. What is the least distance within which the lost trail lies?

By remaining cool, this may be quite accurately determined by the careful traveler. He knows how long he has been traveling on foot or on horseback, and the average rate of his travel, and he can usually make a fine allowance for loitering, stoppages and remembered zigzags. The lost man may always console himself with the fact that he is nearer the lost trail than he imagines.

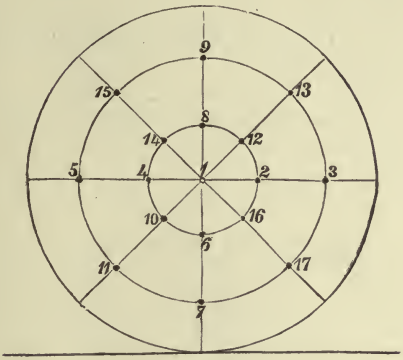
B. What is the general direction of the trail?

The traveler should at all times keep in mind the general bearing of prominent landmarks, and the general courses of important streams and ridges. During sunshine, the shadows of trees, etc., will give east and west points. In tropical countries, Orion and Antares give excellent east and west points, and are easily sighted. An almanac, showing the times and bearings of sun rise, sun set, moon rise and moon set for various latitudes, is invaluable to the mountain traveler.

C. On leaving the trail, was the travel to the right or to the left of it?

This question must be answered from memory or the

note book, and it is very important that the traveler be able to answer it with proper assurance.



Suppose the traveler is at 1 when he decides that he is lost, and suppose that the trail certainly lies within the distance 1—7; then the circle 7—3—9—5 cuts the trail somewhere. The traveler starting from 1, may first go to 7, and then, in the extreme case, make the entire circuit 7—3—9—5—7, or travel a distance 7.28 times 1—7 before exhausting his search. Now, suppose that both questions A and B can be answered and that the trail lies within the directions 1—15 and 1—13; then, the trail somewhere cuts the arc 15—9—13, or possibly the arc 11—7—17.

Produce 7—1—9 until it cuts the tangents to the circle 7—3—9—5—, which are perpendicular to 1—15 and 1—13. Call this distance x. Now this line must cut every trail within and parallel to 1—15 or 1—13 that cuts the circle, and it is furthermore obvious that it must cut every trail that is within and parallel to an intermediate direction.

Since $x = \frac{1—13}{\cos 13—1—9} = \frac{1—9}{\cos \frac{1}{2}\ 15—1—13}$; when 15—1—13

$=60°$, $x = \frac{1-9}{\cos 30°} = (1—9)\ 1\frac{1}{6}$, nearly; when 15—1—13 $=90°$, $x = \frac{1-9}{\cos 45°} = (1—9)\ 1\frac{1}{2}$, nearly; when 15—1—13$=$ $120°$, $x = \frac{1-9}{\cos 60°} = (1—9)\ 2$; when 15—1—13 $= 140°$, $x = \frac{1-9}{\cos 70°} = (1—9)\ 3$, nearly; etc.

Now, if the traveler is unable to answer question C, he must be prepared to travel from 1 towards 9, a distance equal to x, then back through 1 towards 7, a distance of $2x$, or a distance of $3x$ altogether. If, however, he can answer C, he has no return journey to fear and at worst has to travel towards 9 or 7, a distance equal to x. From this, may be seen the great advantage in being able to answer questions A, B and C conjointly, and how very important it is to know the answer to question B, since x changes so rapidly with the angle 15–1–13.

Before sending out scouts or detachments, certain elementary signals should be agreed upon. For instance, let

a wave with one hand designate 'hurry,' 'come on,' etc.—let both arms raised designate 'yes,' 'all right,' etc.—let both arms lowered designate 'no,' 'wrong,' etc.—and let both arms extended latterly and horizontally designate 'halt,' 'go back,' etc. Such a precaution will frequently do away

with the necessity of messengers making difficult and dangerous journeys. A distant scout might signal by walking or riding from right to left or from left to right, etc.

During the "Sheep Eater" Indian campaign in the Salmon river mountains, in 1879, Colonel Bernard, of the cavalry, came to the conclusion that signal rockets were invaluable in such a country, where the commands were of necessity separated by rocky and almost impassable ridges, and urgently recommended their use. The idea is an excellent one; for, besides their value as signals, they terrify the savages and produce a wholesome effect upon their superstitious natures. I believe a few rockets, kept for emergencies and judiciously sent up, might frequently avert the intended attacks or stampedes of Indians.

I have found, by experiment, that it is a splendid plan, when going into the mountains, or over very rough trails, and there is a probability of messengers being needed, to collect a few dogs on leaving the last settlement. They may be picked up or purchased for almost nothing, and the guard may lead them along with the command without any great trouble. Whenever it is necessary to send back a message, advantage may be taken of the dog's restlessness. Having made the message fast to his neck, let him go with a kick; it will be but a short time before he finds his way back to the settlement, having served as messenger.

In order that the pack animals may keep well up on a long mountain journey, continually going up and down steep hills, it is necessary to load them as lightly as possible. So far as is practicable, articles of food should be selected with a view to easy transportation, when a rough journey is anticipated.

Chollet's preserved vegetables are excellent on the score of bulk and light weight. One ration weighs less than an ounce, and a cubic foot contains about 600 rations.

The prepared meat biscuit used by the French and Prus-

sian armies is a very portable form of food, and of great dietetic value.

Cold flour, made by pounding parched corn to the consistency of coarse meal, and adding a little sugar and cinnamon, is another portable article of subsistence,and is much used by the Indians when they expect to make long journeys with little transportation.

A small quantity of the flour is mixed with water and taken when the traveler feels thirsty and hungry.

All these prepared articles have excellent anti-scorbutic properties.

The prepared 'horsecake,' originally brought into use by the Germans, would be excellent to take into the mountains, on pack animals, with mounted troops, and would certainly favor a great economy.

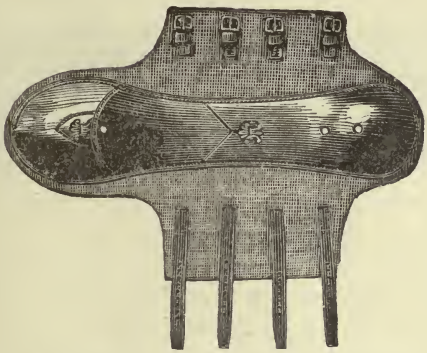
The loads are frequently rendered very heavy, in consequence of getting under water while crossing the mountain streams. The greatest care should be exercised in hunting suitable fords for the loaded animals. Old Indian trails and often the game trails lead to the most practicable fords.

The wear and tear of mountain traval is enormous. From the first, the most exposed parts of the clothing should be protected, and too great pains cannot be taken to properly protect the feet and limbs of the animals.

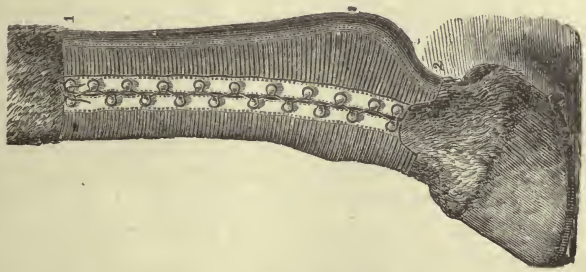
Chaparejos, made of buffalo, elk or bearskin, are invaluable in very cold climates and are most excellent for preserving the trowsers, when exposed to rough and long continued wear. They may be easily made, while on the journey, by utilizing the skins of the animals brought in by the hunting party.

The feet and lower limbs of the animals need the most constant care and attention, subjected as they are to rocks, crags, bramble, etc. All boots should be well made and never chafe or gall, in any way, the animal that wears them—a horse is more injured by wearing poorly and improperly made boots than by his interfering habits.

The drawing shows a simple but excellent combination



knee, shin and ankle boot. A few of these should always be taken along, as they are simply invaluable when following very rough mountain trails. Even a light stocking, improvised on the march, is good for strengthening the muscles, tendons, cords, etc. If practicable, it should be made



of shirred, elastic material, and should fit closely around the leg, at the points marked 1, 2, and 3, in the drawing.

Such a stocking very effectually prevents sprains or other accidents to the legs of the horses, and is very good for those with swollen veins, sprained or weak joints, etc.

Where the animals are continually going up and down hill, the motion of the cinch will occasion galling if not

carefully watched. The cinch should be made of soft hair and corded down the center; the edges will then give suffi-

ciently to prevent rubbing, when the cinch is drawn very tight.

Lieutenant S. C. Robertson, First Cavalry, who was with me during my reconnaissance of the Clearwater and Salmon rivers, Idaho Territory, in 1880, has contrived a rawhide shoe, which appears to be valuable, inasmuch as it may be readily constructed while in the field, and when ordinary shoeing is impossible. I have never tested Lieutenant Robertson's shoe, to my own satisfaction, but I have no doubt as to its being excellent in some respects.

Speaking of the shoe, Lieutenant Robertson says: "I have experimented this summer with a horse-shoe which, so far as I know, is my own idea, and which was suggested to me by the sufferings of our horses over the rugged country of our last year's scout. It is made of rawhide—two thicknesses, subjected while 'green' to pressure, and secured to the foot by T-shaped nails, with the heads flat and broad enough to cover the whole width of shoe. In dry weather, it works well and I am convinced that such a shoe (with, say, a thickness of felt added next to the foot) would be a boon to footsore horses, over such mountains of rock as we traveled last summer. It has the disadvantage of non durability in prolonged wet weather; but, its lightness, elasticity, toughness and thorough protection of the foot, for a limited period, undoubtedly make it both adaptable and beneficial for temporary use of such horses traveling over rocks and painful trails."

CHAPTER VII.

Pack Mules and Packing.

Pack animals travel with ease through sections of country which are impassable for wheeled carriages of all descriptions. Horses, ponies, mules, oxen, elephants, camels, goats and dogs are more or less used as pack animals in different countries, and the variety of packing gear is very great. The nature of the country to be traversed and of the load to be transported will in a great measure determine the form and adjustment of the gear.

The *mule* is the favorite pack animal in the United States, but I believe the ox is far superior and would be in great demand, were it only fashionable to use him as a pack and saddle animal. Oxen hold out much better than mules over *long* marches, are much cheaper, are less liable to be stampeded by Indians, are easily caught when needed, and in case of emergency may be used for beef.

The mule is the offspring of the male ass and the mare. As in other hybrid animals, the males are the more numerous. There is no instance on record of offspring produced by two mules. The hinny is far inferior to the mule in size, strength and beauty.

Pack mules should not be too large or high on their legs. The Spanish-Mexican mules, for endurance, are superior to all others. These mules are small, but can stand a great amount of abuse and starvation and will suffer but little from the effects of a hard drive. Being smaller than the American mules, they can fill up in a much less time, and it

will be found that in three hours on thin grass they will fill up and recuperate better than American mules on the same pasture in six hours. This, I believe, is the secret of small mules outlasting the large ones in the mountains and on the prairies. The time spent in camp is not sufficiently long, when the grass is scarce, to allow a large one to find enough to eat. The small mule finds sufficient in a short while and has some time left for rest and recuperation.

Experience shows, moreover, that strength, activity and endurance do not increase in the ratio of the size, and that the smaller of two mules surpasses in these qualities ; white, dappled or spotted mules, known as calico mules, are not near so hardy as those of dark and uniform colors and should be avoided. Mares are to be preferred to horse mules, being more tractable and following the *bell mare* (madrina) better on the trail. A white or grey animal should be selected for the madrina if possible. Usually "she is an old steady mare with a little bell round her neck, and wherever she goes, the mules, like good children, follow her. If several large troops are turned into one field to graze, in the morning the muleteer has only to lead the madrinas a little apart, and tinkle their bells, and, although there may be 200 or 300 mules together, each immediately knows its own bell, and separates itself from the rest. The affection of these animals for their madrina saves infinite trouble. It is nearly impossible to lose an old mule ; for, if detained several hours by force, she will, by the power of smell, like a dog, track out her companions, or rather the madrina ; for, according to the muleteer, she is the chief object of affection. The feeling, however, is not of an individual nature ; for I believe I am right in saying that any animal with a bell will serve as madrina."

When in the vicinity of hostile Indians or horse thieves, the mules are easily secured at night by being herded, teth-

ered, hobbled, haltered or driven into some enclosure. The dangers apprehended and the nature of the country determine the manner. When hobbles are used, the fetlock straps should be made of thick leather, the inside smooth and soft, and the sewn edges uppermost, when on the animal's legs. Messrs. Main & Winchester, 216 Battery street, San Francisco, California, make a specialty of packing gear, and all articles pertaining to field outfits. Their illustrated catalogue will be valuable to those preparing for the field. When the animal is tethered and the rope is long enough to permit walking and feeding in a large circle, it should be provided with a wooden swivel, readily made as represented in the drawing, in order to prevent twisting and entanglement. Mules are dangerously skillful in the use of their heels, and one cannot be over careful, at all times, in guarding against the results of this skill.

The Indians instinctively fear their heels and will seldom lend a hand in packing them.

Mules work best when between three and six years old and are from twelve to thirteen hands high. In fitting out a train, as few different kinds of animals should be taken as possible, or they will run in different herds and require much more attention; and in the selection of mules, care should be taken to see that the dentition of the upper jaw is free from deformity. Mules are often overhung or parrot beaked,—that

is, the upper row of front teeth projects so far beyond the lower that it is impossible for the mule to bring them together. This defect soon occasions a loss of condition and weakness, as such mules are able to gather but little food. Care should be taken that the tongue is also perfect.

Horses and ponies, for packing purposes, should be of cobby and short-legged breed.

Experience and practice in the handling of rope are essential in lashing, cross-lashing and interlacing, so as to make fast in proper shape the hetereogeneous objects of an ordinary cargo. In this connection it might be well to practice making the common and important knots. Referring to the diagram, the manner of forming them is readily understood.

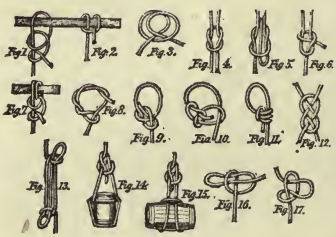


Figure 1, shows two half hitches, useful for making a rope fast to a spar, but should not be used for hoisting a spar. A single half hitch is formed by passing the end of a rope around the standing part and bringing it up through the bight.

Fig. 2, is a clove hitch made on a spar.

Fig. 3, is a clove hitch to pass over the end of a spar. It binds with excessive force and by means of it, a weight may be hung to a smooth vertical pole. When used in lashing, the end should be twisted round the standing part.

Fig. 4, is a reef or square knot, useful for securing all lashings where the ends of a rope meet. To undo it, take the end of the rope and its standing part, and pull them in opposite directions.

Fig. 5, is a draw knot, for small rope, same use as reef knot, but the ends are doubled back and afford greater facility in untying it.

Fig. 6, is a single sheet bend. This does not jam, and is useful in joining two ropes.

Fig. 7, is a fisherman's bend, for fastening ropes to rings, etc.

Fig. 8, is a timber hitch, useful for lifting spars, dragging material from place to place and hauling carriages, etc., out of ditches, when drag ropes are not at hand. It will not give as long as the strain is kept up, but when the strain is removed, it is cast loose at once.

Fig. 9, is a bowline. It is difficult to undo; with it the two ends of a rope are tied together, or a loop made at the end of a rope. For slip-nooses, use the bowline to make the draw loop.

Fig. 10, is a running bowline.

Fig. 11, is a slip or hangman's knot.

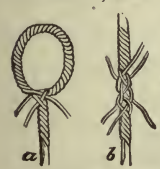
Fig. 12, is a carrick bend, useful for joining two ropes and for making the guys for the head of a spar.

Fig. 13, is a sheep shank knot, and is used to shorten a rope temporarily without cutting it or unfastening the ends.

Figs. 14 and 15, are handy barrel slings.

Figs. 16 and 17, are simple forms of slip knots, destroyed by freeing the loops and drawing on the free ends.

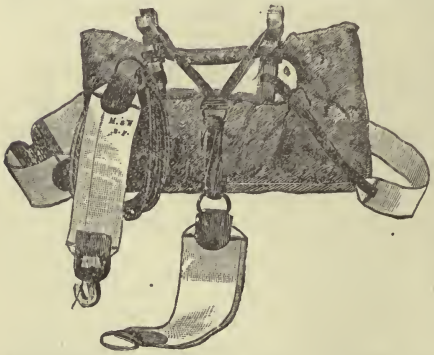
To make a *short splice*, unlay the strands for a convenient distance, take an end in each hand, place them one within the other and draw them close together. Hold the end of one rope and the strands which come from the other, in the left hand—take the middle strand, pass it over the strand next to it, under the second and out between the second and third, and haul it tight. Pass in a similar manner each of the six strands, first those of one end, then those of the other. To taper the splice, untwist each strand, divide the yarns, pass one-half as described above and cut off the other half.



To make an *eye splice*, unlay the end of a rope for a short distance, lay the three strands upon the standing part, forming an eye. Put the first end through the strand next to it, the second end over that strand and through the second, and the remaining end through the third strand on the other side of the rope. The ends are tapered as in the short splice, by dividing the strands and again passing them.

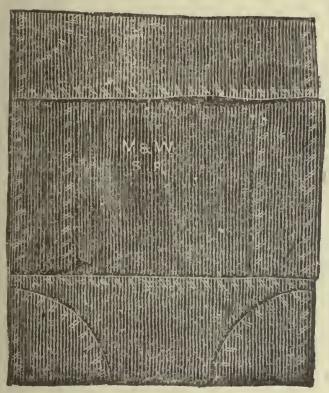
Many of the pack saddles in use at this time are mere instruments of torture and laceration.

The cross-tree saddle and gear, represented in the drawing, is used to a great extent by the Indians and traders in the Northwest. This description of saddle is very well adapted for smooth roads and evenly formed packs, but for scouting trains or the professional packer, where objects of every imaginable shape and various weights are to be transported, nothing has yet been invented so suitable as the *aparejo*, composed entirely of hide.



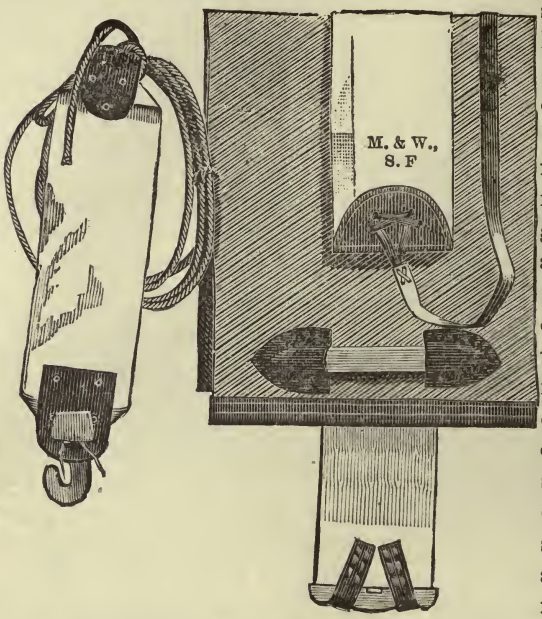
It is a strong leather sack, about two feet wide and from 55 to 60 inches long, according to the girth of the mule. It is used as a pad to protect the mule's back while packing. A seam running from the front to the rear of the aparejo divides it into two equal parts, each of which is composed of a double layer of hide, with sufficient space between to introduce a suitable stuffing of hay, grass, moss, fibre, etc. These side flaps, when fastened together at the top, form a ridge within which the back bone of the mule rests free from friction or pressure. On the inside of each flap is

left a circular hole through which the stuffing material can at any time be reached. The careful packer should keep the stuffing evenly distributed, or so as to vary with the conformation of the back of the particular mule, as portions of it are constantly shifting and working up into lumps, in consequence of the travel. To *set up* the



aparejo, or to give it evenness and stiffness, small ash, rose or willow sprouts from ½ to ¾ of an inch in diameter, and as long as possible without springing (any tough and elastic wood will answer), are placed inside of it and at equal distances apart—about 2 inches. On the inside of these and towards the mule, coarse grass or hay (such as is light and tough and will not break up) is placed layer after layer until the sides are as full as possible. The corners should be stuffed as hard as possible, by means of a sharp stick. Serious trouble is often experienced on long and toilsome marches, from loss of flesh, causing the aparejo to fit badly and cause a sore-back. Great care must be taken to make good all deficiencies in the stuffing, and when the aparejo is too large to be adapted to a thin mule, by stuffing, a portion should be cut out of the centre. Straw pads are useful for protecting the hips and withers, when placed under the cinches of those animals carrying rough loads. When the aparejo is placed on the mule's back, it is covered with a piece of canvas or matting, made to fit it, called the *Hammer Cloth.* Two pieces of hard wood, about 1 inch thick, 2 in. wide, round on the outside and beveled to an edge at the

ends, are placed about 6 in. from the ends of the cloth. Leather caps are stitched over the ends of the wood. To secure the hammer cloth, aparejo and the blankets beneath it to mules, a wide girth called a cincha (usually called cinch) is used. It is made of hide or strong canvas, about six feet long (a little too short to go around the mule's body over the aparejo), from 15 to 20 inches wide and so folded as to bring the edges and stitching in the centre. A semi



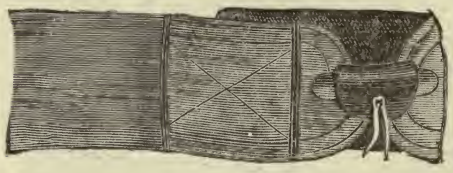
circular piece of leather, provided with holes or a ring, is stitched on one end, and two loops of strong leather and a slider of hard wood on the other. The cinch is tightened

by drawing the two ends together, by means of what is known as the latigo strap—made of strong bridle leather about six feet long, an inch and one half wide at one end and tapering to one-half inch at the other. When the strap is sufficiently drawn, a loop is formed in the free end and the bow is pulled under the front and back lashings of the strap. To relax the cinch and set all free, it is only necessary to pull on the free end of the strap. For very small animals a short cinch (one end furnished with a ring and the

other with a stick, bent into the shape of a hook), attached to a rope at the ring may be used.

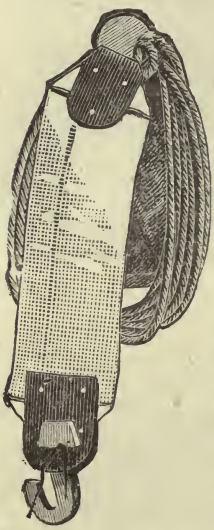
Next to the skin of the animal is placed a piece of clean cloth, or an ordinary woolen blanket neatly folded; over this is placed the saddle cloth, called by the packers *Corona.* This is made of woolen cloth, with worked ornamental borders. It consists of two or three folds of cloth stitched together. The letter or name of the mule to which it belongs is generally stiched upon it in colored cloth. In taking the corona off, grasp it in the centre, front and back, let the sides come together and place it across the aparejo, back to the rear. The sad-

dle blanket proper (an ordinary U. S. blanket) goes on top of the corona, and may be used as bedding in camp. The tendency of the aparejo to work forward is overcome by a wide crupper (the dock rest being of soft and round leather



attached to its out side and passing back over the hips It should be carefully adjusted and always kept clean.

Knots of any description should not be tied in the straps or ropes of the packing gear with a view to shortening them. It is proper to make more holes if buckles are used,



or to cut to the proper length. Knots and galls go together. The *sling-rope* (of hand-laid manila rope)should be about 15 feet long and one-half or three-quarters of an inch in diameter. The packs are made fast and retained on the mule's back by means of a cinch and lash rope. The cinch is made of strong canvas, about eleven inches wide and one yard long, doubled so that the edges are in the middle. Strong pieces of leather are firmly stitched on both ends and on both sides, with the canvas cinch between, as shown in the drawing. A three-inch iron ring is made fast at one end, and a hook of hard wood at the other. Natural shapes are usually selected for the hooks. The lash rope is of 1¼ inch hemp rope or raw hide, about 35 feet long, with one end spliced to the cinch ring.

The following are evident advantages of the aparejo :

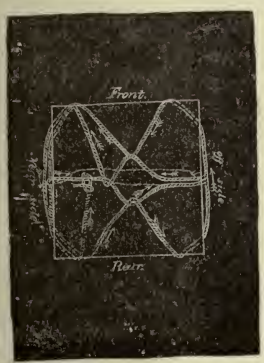
Its shape enables all loads to be balanced. One hundred

pounds on one side may be made to ride with 50 lbs. on the other, without straining the mule. It presents much more surface for pressure to the mule than any other form of pack saddle does. The lower corners secure the lash rope and prevent its slipping when on the road. By removing the hay or stuffing from the sides, a sore back may be easily remedied, and by properly adjusting the filling, the aparejo may be made to perfectly fit a badly shaped back.

The *pack cover* or *manta* should be about 5 feet square and made of water proof canvas.

The blind or "tapajo," made of leather with strings and loop, should be invariably used while packing or adjusting a disarranged pack. When not on the mule's head, the blind may be used as a whip.

Before proceeding to the packing drill, the knot formed by the lash rope, on the top of the pack, should be carefully studied. A knowledge of its construction will make the packing process very simple.



It requires two men to properly pack a mule. No. 1 is habitually on the near or left side, and No. 2 on the off or right side of the mule. To teach the art of packing, the instructor commands:

1. *Prepare.* 2. To Pack.

At this command, No. 2 places the hackamore upon the mule, leads him on the off side of and near the rigging, places the blind and assumes his position on the off side of the mule. No. 1, assisted by No. 2, on the off side, places and carefully adjusts the saddle blanket and corona. (Two). No. 1 seizes the aparejo, the left hand near the centre of its front, the right hand near

the off and rear corner, and places it well to the rear on the back of the mule, when No. 2 immediately adjusts the crupper, and assists No. 1 in moving the aparejo as far forward as possible. (Three). No. 1 passes the aparejo cinch to the off side, till the slider end reaches directly under the mule, and assisted by No. 2, passes the latigo strap downwards over the slider and inwards through the ring, and again over the slider. While No. 1 is drawing the latigo strap moderately tight, No. 2 reaches over the mule in front of the aparejo, seizes its front corners and draws them upward and forward, placing the aparejo squarely over the mule. This being done and the aparejo *set*, No. 1 places his left knee against the aparejo, and seizes the latigo strap as far down as possible, the left hand in advance. (Four). The latigo strap is drawn until the cinch is sufficiently tight; when, No. 1 doubles it and passes it through the loop on the cinch, drawing it tight.

No. 2 removes the blind, and ties the mule at or near his cargo.

If No. 1 is not sufficiently strong, No. 2 passes around to the near side, faces No. 1 and assists him in drawing the latigo strap.

1. *Sling.* 2. The Pack.

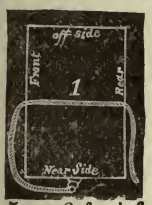
At this command, No. 2 unties the mule, places the blind and takes his position near the cargo. No. 1 seizes the sling rope, doubles it and throws the loop well over on the off side. (Two). No. 2 quietly raises his side of the pack high up on the aparejo, and holding it there with his left hand passes, with his right hand, the loop of the sling rope over the cargo on his side, to No. 1, who passes the ends of the sling rope through the loop, drawing them tight. (Three.) No. 1 quickly places his side of the pack on the aparejo against that of No. 2, holds it there with his left hand, and

passes one end of the sling rope to No. 2, who passes it under a branch of the sling rope already on his side, and back to No. 1.

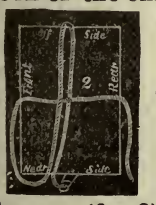
No. 1, resting his left arm against the pack, quickly brings the ends of the sling rope together and ties them, in a square knot, after drawing tight. (Four). Nos. 1 and 2 seize the pack at the lower and inner edges, settle it to the full extent of the sling rope, and carefully balance it; No 2 removing the blind, and gently leading the mule a few steps forward, while No. 1 observes the pack from the rear. No. 1, then places the pack cover, and is assisted by No. 2 in adjusting it. When the mantas are not in use, they are folded and carried on the aparejos under the cinches.

1. *Lash.* 2. The Pack.

At this command, No. 1 takes the lash rope and holding it coiled in his right, seizes it with his left hand near the cinch, and throws it to its full extent to the right; whereupon



he passes the cinch, hook from him, under the mule, and holding it steady, he places the rope lengthwise on the centre of the pack (fig. 1). (Two.) No. 1 now moves forward to the mule's shoulder, draws the lash rope forwards two-thirds of its length, seizes it 5 or 6 feet from the cinch, and passes it doubled to No. 2 (fig. 2), who takes the double in his right hand, and the hook of the cinch in his left. No. 2 then moves his hands,



until he feels the rope tight, when he passes the rear branch of the rope from above into the hook and the slack back to No. 1, who draws it tight with his left hand. He then passes his right hand under his left, seizes the rope in front of the pack and passes it to the rear (fig. 3). (Three.) No. 1 passes the rope in his left

hand under the standing branch from rear to front, pulls it well up on the pack (fig. 4) and forces the bight thus formed below the aparejo. In the meanwhile, No. 2 grasps the end of the rope, passes it under the front standing branch on his side (from front to rear or from rear to front), pushes it to the top of the pack and throws the end in front of the pack on the side of No. 1; No. 2 then seizes the front standing branch with both hands, well down, and places his left knee against the aparejo. No. 1 seizes the front branch on his side, placing his left shoulder against the pack. No. 2 pulls while No. 1 takes in the slack. When all is sufficiently tight, No. 1 says "good," and seeing the pack well balanced passes to the rear and tightly pulls the branch under the aparejo. (Fig. 5). (Four.) No. 2 goes to the rear, pulls the branch on his right and passes it forward under the points of the aparejo. No. 1 moves forward, on his own side, takes the end of the rope, tightens it, passes it down under the points of the aparejo, back to the centre of the pack and there fastens it by drawing it under the standing branches (fig. 6). If the lash rope is very long, No. 1 passes the end to No. 2 who makes it fast as stated. All set, No. 2, removes the blind, ties up the hackamore strap and drives off the mule.

1. *Unsling.* 2. The Pack.

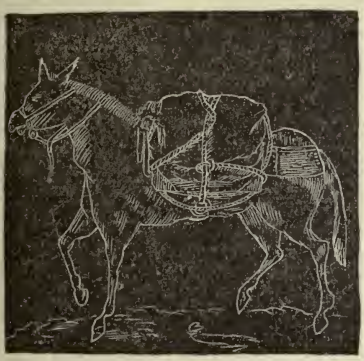
At this command, No. 2 loosens the end of the lash rope, goes to the mule's shoulder and pulls out the branch on his side. (Two.) No. 1 slackens the rear and front branches on his side in succession, passes the front branch under the standing branch from front to rear, withdraws it and

passes the slack to No. 2, who unhooks it, whereupon Nos. 1 and 2 throw the lash rope to the rear. (Three.) No. 1 unties the sling rope quickly. (Four.) Nos. 1 and 2 take down the portions of the pack on their sides.

The aparejo is taken off in the inverse order in which it is put on.

This being done, No. 1 arranges the cargoes while No. 2 collects and assorts the rigging, placing the aparejos in a line, resting on the lower ends of the pads.

The drawing shows the position of the different parts when the mule is properly packed. As the train moves out of camp, each mule should be carefully noticed as he passes. Raising the hips and twitching the mouth or nose indicates *galling*, and should lead to immediate examination. The hackamores should fit very loosely. Nothing is so liable to irritate a mule and give him "fits of fury" as sore ears. If possible, the cargo should be made into two packages of equal weight and bulk, of about 100 or 125 pounds, and the highest loads should be the bulkiest and most valuable stores. All rattling pans, camp kettles, buckets, etc., should be closely packed in sacks and securely lashed on top between the side packs. If carelessly packed and allowed to rattle, the mules will frequently become alarmed and as frequently succeed in dropping their packs.



Strong panniers with lids to hinge and lock are useful for

transporting ammunition, food for the day, change of cloth ing and other articles for immediate use.

Narrow flat battens of stout wood or bundles of twigs will be found handy and useful for placing between the packs and lash ropes. In the case of sacks and the like, were it

not for some interposing medium, the strained ropes would soon cut through and occasion more or less mischief. After a march the aparejos, with the latigos loosened, should be left on the mules for an hour or so, in order that their backs may cool gradually.

Packed mules should not be permitted to lie down, as they are liable to strain themselves in attempting to rise again. Over difficult and long continued journeys, with pastures seldom good, the net weight of the packs should not exceed the half of those readily transported over a level country, furnishing a sufficiency of grain and camps at regular intervals. The question *how must the mule be loaded and urged in order to obtain the maximum work or useful effect*, is an important one. If he transports a light weight, he may make a long day's journey; if he transports an ex cessive weight, he may soon come to a stand-still, and in either case the "useful effect" is little or nothing.

Let D=the distance a mule could travel daily if unloaded.

W=the weight under which he could not travel at all.

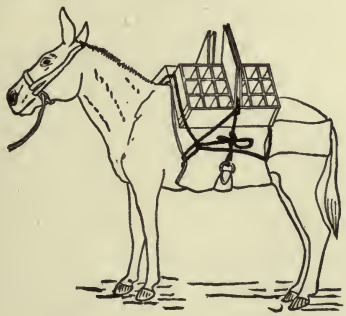
W^1 =some weight less than W, under which he could travel D^1 miles per day. Then, there obtains

$$W^1 D^2 = W (D—D^1)^2 .$$

Now the work or "useful effect" will be a maximum when $W^1 D^1$ is a maximum, or when $W^1 = 4\text{-}9$ W, and $D^1 = 1\text{-}3$ D, or in other words, the mule will accomplish the most work when he transports 4–9ths of the load under which he would stagger, and he will travel just 1-3 the distance he could if he carried no load at all. For example: Suppose a mule is able to travel 20 miles per day bearing a load of 200 lbs.,

and 45 miles per day, when he carries nothing; then from the equation $W^1 D^2 = W (D - D^1)^2$, we find $W = \frac{200 \times 2025}{625}$ = 648 lbs., the load under which he would be brought to a standstill; and from $W^1 = 4\text{-}9$ W, and $D^1 = 1\text{-}3$ D, we find the best load to be 288 lbs., carried 15 miles per day.

This chapter would hardly be complete without a description of the *Madigan Field Ammunition Box* (adapted also for use as Medicine or Mess Chest), to be packed in pairs on either an aparejo or a pack saddle. This box meets all the requirements of active service and by means of it, troops in line of battle or skirmishing may be quickly supplied and are not obliged to lose valuable moments of time, while unpacking, unscrewing covers, etc.



The drawing shows the boxes packed and the manner of using them. Their construction is such that *all* or *any part* of the contents may be removed, whenever desired for immediate use, without unloading the 'cargo,' slacking the lash rope, or even halting the animal carrying them. These are certainly important advantages in case of a surprise or sudden attack upon the train, or the unexpected discovery of the enemy; or, if used for medicine or subsistence stores, in case of sudden illness, or the necessity of eating a meal under circumstances forbidding a halt. Many instances will doubtless recur to every officer of experience in field ser-

vice, where disasters have resulted from not having been able to quickly replenish the supply of ammunition.

The devices by which this box is made available for sudden emergencies, are essentially three in number, viz:

First, and most important:—The angle castings or corner bands in the center of each side of the top of the box, each of which has a diagonal circular opening, or socket, for the lash rope.

Second:—The center partition, 1⅜ inches thick, on the top of which is screwed a center strip, 2½ inches in width, with two lids hinged thereto, opening from the ends.

Third:—The sub-division of the interior of the box, by adjustable partitions, into compartments, adapted in number and arrangement, to the nature of the contents, and shape and size of the packages.

These compartments prevent the shaking or damaging of the packages by the motion of the animal, which would occur with an ordinary box after being partially emptied; and permit the load to be kept practically balanced by tak ing out of each box, alternately, all or part of the contents of one or more compartments,—thus obviating any necessity for unloading, or touching a rope during the march other than the usual adjustment of the lash rope. By fill ing only a portion of the compartments, when the packages are unusually heavy, or when the animal is not in good condition, the weight of the load may be adapted to the circumstances of the case, without danger of rattling, shaking or breaking the packages; for hard bread or other stores of light weight, the boxes may be made larger, if desired; or if *necessary*, four boxes of the usual size *can* be packed on one animal.

No special fittings or attachments, to the ordinary *aparejo* or pack-saddle, are required; the boxes are complete in themselves and in case of emergency they may be packed with very little in the way of outfit—a few old sacks filled

with hay or straw, a couple of cinches and a piece of rope will answer.

The ammunition boxes now supplied by the Ordnance Department are very unsuitable for 'packing;' two being too light for an economical load, while three are awkward to handle, very difficult to lash so as to be kept in place on an *aparejo* or pack-saddle, and are liable to chafe and strain the animal's back.

Mr. Madigan has lately invented a *Tripod and Packing Box for the Gatling Gun* and an *Improved Pack-saddle for Transporting the Hotchkiss Gun*, both of which are highly endorsed by officers serving in New Mexico and other mountainous countries.

CHAPTER VIII.

Marching.

A good commander will so conduct the march as to present his men in fighting order at any moment. With this in view, it will be necessary to observe the following points:

1. All things to be arranged in the column of march in the same order in which they are likely to be required.

2. The cheerfulness and efficiency of the men to be secured, carefully considering the proper indulgences, the weather, the physical features of the country and important hygienic principles.

3. The animals to be herded, loaded, driven and guarded with the greatest care.

When distant from the enemy, or when in broken or dusty country, certain considerations of the first order may very properly give way to ease and comfort, but, as a general rule, the transportation (kept well closed up) should follow closely in rear of the main command.

A few mounted men should constitute the advance guard while marching through the hostile country. They should keep a vigilant lookout in all directions and carefully reconnoitre every place where the enemy might lie in ambush.

When marching without a guide who knows the country, and when the requisites for a camp are scarce, an additional armed party should be sent in advance to hunt the camps. They should make a careful search on both sides of the trail and be sufficiently far advanced to return to the command, in case of failure to locate a suitable camp

within the distance of a reasonable day's march. Thirty-five miles might be considered the limit of search. It is safe to assume that a camp with the necessary requisites, (wood, water and grass), after a march of thirty-five miles, is many times better in the long run than a camp without water and grass even after a small march of ten or fifteen miles.

Numerous circumstances of the march will determine the strength of the rear guard. It should, at all times, be kept close to the transportation, for its protection in case of surprise.

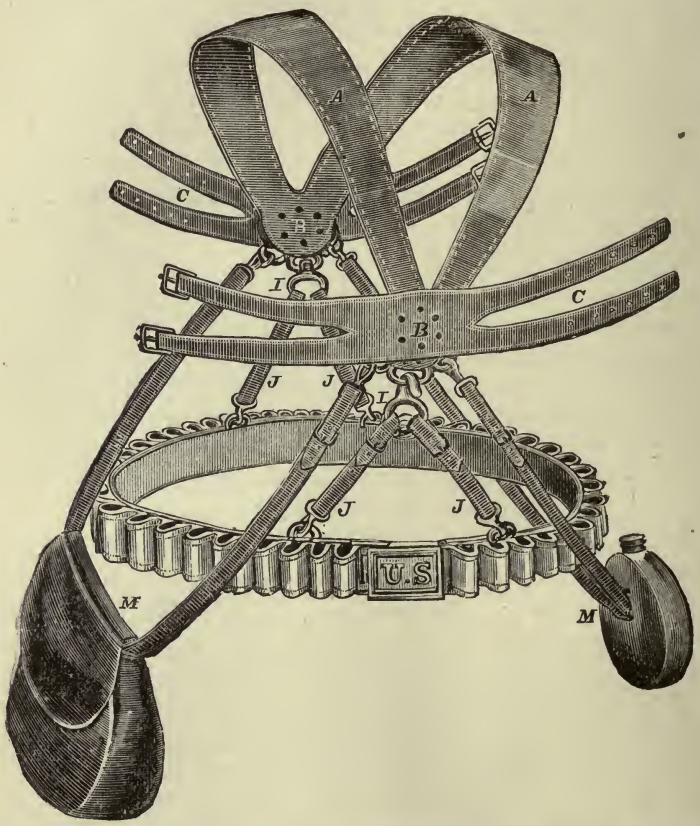
The question of equipment is an important one, when an engagement may be expected at any moment.

The difficult problem of drawing the proper line between the number of articles that should be in hand, when the engagement ensues, and the weight that should be transported on the person has received much attention of late. The excellent campaign equipment, devised by J. E. Bloom, Esq., late of the Artillery, is the nearest approach to perfection, as yet. By this device, the center of gravity of the soldier remains nearly normal, and the strain falls upon those portions of the body which can best bear them.

It seems that the principal objection to the 'roll' as worn during the late war, was that the weight fell upon one side of the body, thus heating it, etc. In Mr. Bloom's system of equipment this objection is entirely overcome, and the soldier is enabled to transport the following with great facility:—One hundred cartridges, (cal. 45), one blanket, one shelter tent, one overcoat, one pair pants, one pair drawers, one undershirt, one woolen shirt, one pair socks, one pair shoes, towel, soap, etc., in addition to his rifle.

The equipment consists in a system of supporting straps, by means of which the weight to be carried is directly transferred to and supported equally by the shoulders, without producing any horizontal pressure upon the chest. This ob-

ject is accomplished by means of a yoke, composed of two leather straps A A, passing over the shoulders and joined by the same rivets at their ends—front and rear, (opposite to the extremity of the sternum bone) both to plates or stirrups



B B, and also to a double blanket strap C C, for securing the blankets and articles rolled therein. The blanket roll is adjusted so as to fully clear, by an inch, the shoulder over which it passes, being thus suspended from a central point

front and rear, upon a line passing through the center of gravity of the body—thus causing such a disposition of these articles as not to disturb the equilibrium of the body.

The weight of the cartridge belt, of any variety, is supported from stirrups, both at front and back, by means of hooks, or hook-plates I I. which are connected with the belt through the adjustable straps and snap-hooks J J. The haversack, canteen, gamebags, etc., are likewise suspended from side slots in the stirrups by means of straps M M. The blanket roll, when firmly made and adjusted, exerts more than sufficient *outward thrust* to counteract all inward strains, (which would otherwise fall upon the chest,) due to the weight of the 'roll,' ammunition belt, etc. This should be passed over the left shoulder, when the soldier is right handed or fires from the right shoulder, and *vice versa.*

The following advantages of such an equipment are apparent:

1. Lightness and simplicity; and, being practically in one piece, there are no parts to be lost by the most careless.

2. Facility and quickness of slinging and unslinging.

3. It does not interfere with the action of the soldier, or the natural equilibrium of his body.

4. It does not heat the soldier ; but allows him to sleep with all accoutrements upon the person—the upper part of the 'roll' forming a pillow for the head.

The European soldier, on going into action, is allowed the following ammunition:—France, 92; Germany, 117; Russia, 120; England, 100; Austria, 119. The equipment described will enable him to carry 100 rounds, in addition to his kit, etc., with ease and safety.

The cheerfulness and efficiency of the men will depend very much upon their being properly supplied and having a sufficiency of time in which to cook and look after their comfort.

Sufficient has already been said regarding the clothing

and foot gear. The drawing shows a form of boot very suitable for long marches over rough and broken ground, and up and down hill, should it be impracticable to wear single soled and laced shoes with leggings. The leg proper is at-

tached to the lower part, about the instep, by means of some strong and elastic material. With this description of boot a long march may be made over rough and rocky ground without wearying or injuring the foot.

With an easy fitting shoe or boot, a march over the most rugged mountain, where the mind is kept busy with a constant change of scenery and the muscles rested by a variety of action, is far easier than the same march over a level plain, where there is little or no stimulant to greater exertion.

Even with the most careful management and preparation for the march, it will not do to expect too much the first few days, as it requires some little time for persons and

things to settle into the new condition of matters. Sufficient allowance must be made for the reluctant co-operation of individuals, inasmuch as they have a much less interest in the success of the expedition than the commanding officer. It is a frequent question with them, *why should we tax our energies and risk our lives in an enterprise for which we receive so little remuneration and about which we are indifferent?* This is most frequently the case with recruits, and it is a good rule to march all such near the head of the column, as they experience less fatigue than when following in rear, and are more inclined to exertion, knowing that they are watched by older men, and that they will be supported by them in the moments of danger.

When long journeys are to be made, the daily marches should be short: for, if too long, rapid or ill-regulated, sickness is sure to result.

Brief halts should also be made, their frequency depending upon the condition of the 'trail' and weather. It is a fair rule to march three miles (one hour) and then rest ten minutes. Places having a free circulation of air, well shaded and near running water should be selected for halts, when possible. Considering all things, it is best to start on the march with the early dawn, 'noon' a few hours during the heat of the day (near grass and water), and continue the march in the afternoon. In this manner twenty miles per day would be but a fair average march over the mountains. The march on exceedingly hot and rainy days should be completed before noon when possible.

It should be made an invariable rule to serve the coffee before marching, without regard to the hour.

The frequent use of water on the march is a matter of habit; some drink at every spring or stream and as often as twenty-five or thirty times in a day, while others will be satisfied with two drinkings during the same time. Thirst may be prevented, to some extent, by drinking a large quan-

tity of water before breakfast, or by chewing a green leaf or twig, when thirsty. Water from stagnant pools should be purified before using, or fevers and dysenteries will follow. When drinking from a muddy pool or stream, place the shirt sleeve or handkerchief over the mouth and thus avoid the particles of dirt. When marching through poorly watered sections of country, I have found it an excellent plan to fill the canteen, before leaving camp, with a mixture of water and unsweetened tea or coffee. This when taken cold on the march, allays the thirst and is an excellent beverage.

There is nothing more hurtful to a command than to be compelled to make long or forced marches while fasting. To prevent such, a lunch should be taken when possible.

The drawing shows a handy air-tight and elastic lunch-pouch. It may be attached to the belt or carried in the pocket, and will preserve a small quantity of food in good condition. When not in use, it may be so folded as to occupy a very limited space, and may be made to serve a number of useful purposes while in camp.

I would recommend that the monotony of travel be relieved by what might be termed 'noted days,'—having an extra good meal, a larger issue of sugar, tobacco, etc., than usual, and a shorter march if expedient. Such anticipated rewards for extra services, especially with Indian scouts, accomplish much good.

The formation of all cliques, whether on the march or in the camp, should be prohibited; but, anything in reason should be done to promote the merriment of all.

When the animals have been recently taken from grain, it is necessary to make very short and easy drives for the first few days; and sufficient time should be allowed for drinking, at suitable periods, while on the march. When making night marches over an unwatered section of country, if there be any dew upon the grass, the stock should be allowed to halt and graze every hour.

Alkaline springs are of frequent occurrence in mountain valleys, and may be detected by the yellow color of the grass growing around them. The animals should not be allowed to graze near them or drink the water, which is exceedingly poisonous.

It will seldom injure the animals to vary their hours of rest and labor; and when the day bids fair to being very warm, it is often well to start them on the march hungry, make an early drive and go into camp before the heat of the day.

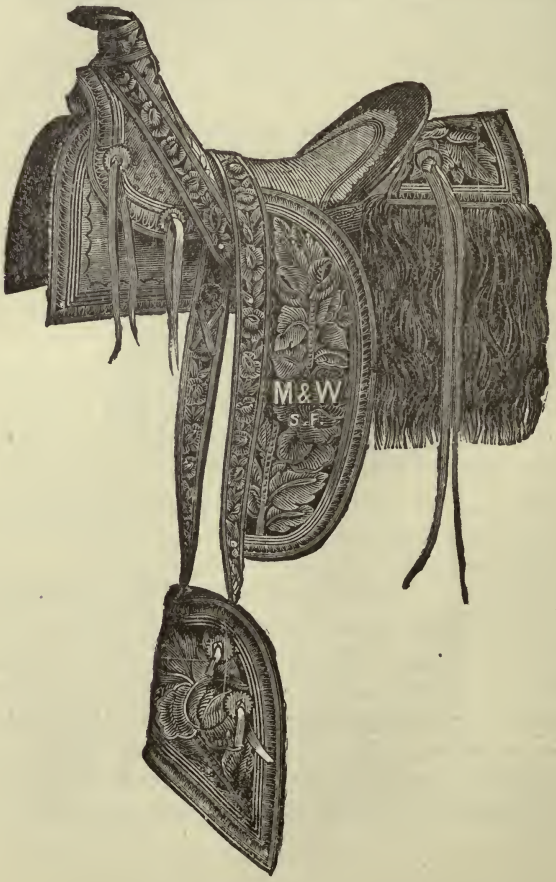
During the first days of the march, it can be ascertained what animals are wild and likely to lead off the herd or cause other mischief; all such should be carefully led, the others being permitted to run loose, in order that they may pick up grass along the 'trail' while moving. The stock should not travel faster than at a walk, nor be taken off for hunting purposes, unless necessary.

In going up or down rugged mountains, all packs should be firmly lashed, in order that the animals may better support their burdens. On first starting out they will appear to be hardly able to move under the loads, but soon the packs will settle, the lashings loosen and they will experience no trouble. The packers should be vigilant and see that the packs do not work loose and that the animals do not scatter along the trail. The train should not be stopped

to adjust a cargo—only the mule in question should be halted, the others being compelled to move on. The aparejos should not be removed while on the march, nor while 'nooning,' for less than an hour.

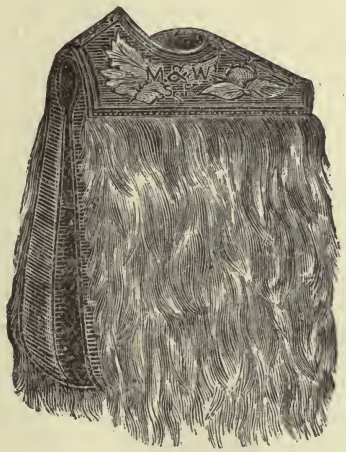
There is much truth in the saying that the best packers are those who make the least use of the whip and the most use of their tongues.

The Mexican or California saddles are extensively used



throughout the Western country; and, in proportion to their excessive cost, are considered by the traders and Indians far superior to any other saddles manufactured. They are usually furnished with wool-lined bastos, llama skin anqueras, sudaderos, tapaderos and stirrup leathers handsomely cut-stamped. When made of good material, in addition to giving perfect satisfaction, they will last a century and then command a fair price.

These are usually accompanied by 'Cantanas' of goat, seal or llama skin, which are invaluable when traveling without pack animals or wagons.



These are frequently so constructed as to admit of being taken off the saddle and borne on the person.

There is some diversity of opinion as to the best mode of slinging the rifle while on horseback.

With a short rifle or carbine there is no better way than to suspend it over the left shoulder, by means of a broad strap made fast to the piece near the guard, the muzzle passing through a loop attached to the stirrup strap.

A very handy way of carrying the rifle, especially a long one, is to allow it to rest horizontally against the pommel of the saddle, in front of the body and above the legs. It may be steadied by passing it through a loop of wide leather, slipped over the pommel, and by an occasional appliance of the hand. The rifle, if loaded, should be invariably carried at a half cock ; but, indeed it would be far better to transport it unloaded, unless a sudden attack or surprise might be expected.

I think it much better to carry the revolver at the side than to place it in a holster attached to the saddle, as in the latter case it is often useless, when dismounted.

It is quite important to frequently take the bearing, when facing towards the starting point, as this will materially aid, should the return march be made over a different route.

It will be surprising to ascertain how few persons are capable of retracing their steps without a guide or compass, for any very great distance. Men of noted intelligence and soldierly qualities, but without a cultivation of the sense of locality, have been known to wander about in a circle for several days, being within 500 yards of the 'trail' or objective point all the while, yet absolutely lost.

Before starting on the march a strong lariat, not less than fifteen feet in length, should be secured. The best are made of rawhide plaited. When coiled and provided with snappers they may be made fast to the front of the saddle, and carried without any interference. They may be used for lash ropes and in innumerable emergencies arising during the march.

CHAPTER IX.

FORCED MARCHES.

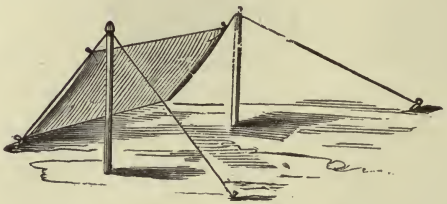
FORCED marches, both offensive and defensive, are frequently necessary; and, in either case, the important considerations are to travel rapidly without encumbrance and to have at hand all things necessary for the comfort and safety of the command.

The matter of proper equipment for the forced march is frequently a difficult one, when the element time is an uncertain factor, and the character of the country to be traveled over is unknown. Assuming that, in case of necessity, the country will afford the necessary supplies, the question of most proper equipment may be easily disposed of in particular cases. Whether the troops are mounted or not, the equipage should be selected so as to avoid all strains and unequal pressures; and, with a constant view to comfort and convenience, the useful points should be most numerous and the weight *in toto* a minimum.

Of course, the time will never come when regular troops will scout or campaign without tents; but there is no doubt as to the bivouac, a temporary make-shift, being far preferable to tenting in a dangerous or rugged mountainous country. Bivouacking is not only healthier, in consequence of the soldier inhaling purer air, but he is enabled to better see and hear, and does not indicate to sneaking hostiles the exact spot where he is lying and enable them to move accordingly.

A mound of sand or earth, covered by a cloth or blanket, will make an excellent pillow; whilst a blanket judiciously pitched over a little turned-up earth or accumulation of twigs,

leaves or grass, serving as a comfortable bed, will give a shelter surprisingly complete so far as protection from cold winds or drifting rains is concerned.

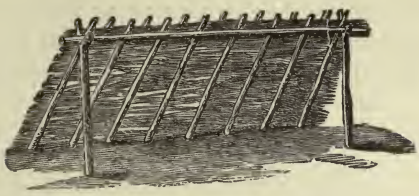


This plan of flying camps could be very advantageously carried out by transporting extra *combination blankets*, so made as to admit of being worn as aprons when moving through wet bushes or during rainy weather, and to be packed when not in use, singly or in great numbers (as horse blankets) upon any loose stock that may accompany the command. The blankets will prove invaluable for many purposes, after the march is completed, even if it is not desirable to adjust them as shelters. The Indians of the Northwest, when traveling rapidly, invariably transport their extra blankets on the lead-horses, and make such uses of them as the nature of the weather necessitates.

When without cover of any description, a shelter may be frequently made by selecting several small trees or bushes, cutting away the lower branches and drawing together and interlacing the upper ones. Others, if needed, may be added —loose grass and twigs being thrown over all.

A still more substantial shelter may be made, if the material is at hand, by sinking two forked uprights, placing a horizontal pole across them, inclining a number of shorter poles and closely interlacing small twigs, grasses or reeds.

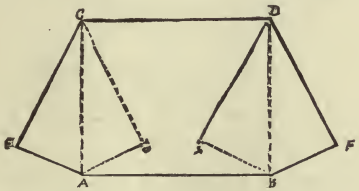
A very simple shelter may be formed by placing several poles in a semi-circle, and binding the small ends together with a rope or thong and covering this frame with canvas,



blankets, hides or brush. It is preferable to the foregoing, having its sides covered.

The time has now come when our camp equipage needs reconstruction. As a help in this direction, the author's PORTABLE COMBINATION SHELTER, STORM AND COMMON TENT has been perfected, and criticism has been invited from various sources at home and abroad. Many prominent officers of the army and the National Guard have expressed their approbation of the same, and thus far not an adverse criticism has been received.

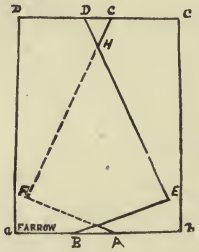
The tent consists of a peculiarly shaped sheet of light canvas or other suitable material, having a strong cord and flaps (several inches wide) about its edges and furnished with *hooks* and *rings* or *tapes* at suitable intervals. The shape of



the tent is described as follows: A B D C is a rectangle; B F = ½ F D; A E = ½ E C; B F D and A E C are right angles. For *regular troops* C D = 6 feet, and for the *officer's tent* C D = 7 feet.

The shape of the canvas is such as to permit its being secured about the kit so as to thoroughly protect it—the triangular end flaps being folded over before rolling; also,

when folded over from both sides along lines parallel to A C and B D, and at distances from them a little less than one-fourth of C D, as shown in the accompanying drawing, to form an excellent bed covering for a single sleeper. When spread upon the ground, the blankets are placed upon the central portion of the rectangle A B D C. The canvas is



in this manner, a double layer of canvas covers all of the sleeper (his feet resting along the line A B) except his head, which appears at the triangular opening D H C.

When used as a shelter tent, the edges E C, C D and D F, rest upon the ground. When pitched in this manner, the

tent covers a maximum *available* space for a minimum canvas, with the following advantages:

1st. *Quickly, easily and securely pitched.*

2d. *The tent is composed of but one piece of canvas—the allowance of one man.*

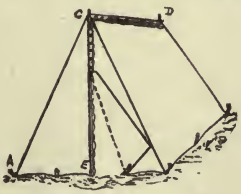
3d. *Three of its faces are covered, two of which may be raised for the purposes of ventilation.*

4th. *By attaching a blanket, extra piece of canvas or a second tent along the upper edge, the fourth face may be closed; or, by varying its inclination, more or less shade may be secured.*

Two of these tents may be so combined as to form a tent having a large base and a small altitude, that will withstand a *wind storm* (a component less than one-half of the force of

the wind tending to overturn it). In consequence of the gradually sloping walls, there is much available space for the purposes of shelter and sleeping. By subjecting the canvas to the *Neptunite* process, it will shed the water, during a *rain storm*, when pitched in this manner, and will not become heavy by wetting. If concealment be desirable, this form of tent is particularly valuable.

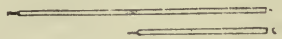
The drawing shows how two *shelters* may be combined so as to form the common or 'A' tent. Here the canvas is reversed. The edge C D is at the ridge, and the edges E A,



A B and B F rest upon the ground.

The poles used for the *shelters* are joined *two and two*, and form the long poles required for the common tent. This form of tent is particularly desirable during *rain storms*, and is well suited for officers and others, living two in a tent, who are liable to become separated at any time. It moreover furnishes a covering for the kit of each, and the individual will at all times have his proper allowance of canvas with his own bedding, or in case of forced marches, etc., he may carry it on his person or behind the saddle.

The poles are made of *strong and light wood*, with plain ferrule joints and projecting screws, which serve to strengthen the joints and hold the corners of the canvas in place, being run through a worked hole or ring arranged for the purpose.



The shelter tent may be neatly pitched, without poles, whenever it is possible to suspend the ridge rope (formed by uniting the guy-ropes) between trees or their branches, piles of stores, saddles, aparajoes, rocks, etc.; or, it may be pitched against a fence, fallen tree, etc. When without poles or any facilities on the open prairie, either the carbine or ramrod will make a good substitute.

The following is an extract from the proceedings of a Board of Officers, convened at West Point, N. Y., per Special Orders No. 123, Headquarters Department of West Point, to examine and report upon the merits of this tent :

DIMENSIONS OF OFFICER'S TENT PITCHED.

First—as a shelter tent. Base 7 feet square; 3½ feet high.
Second—as a storm tent, combining two shelter tents, omitting the poles of one. Base 7 feet by 14 feet ; 3½ feet high.
Third—as a common or 'A' tent. Base 7 feet square; 7 feet 2 inches high. Weight, including poles, 3 lbs. 2 ozs.

The following are some of the advantages of the tent :

1. Capable of sub-division.
2. Maximum available space for minimum canvas.
3. Same poles for each form of tent.
4. The tent is expeditiously pitched.
5. As a shelter tent it is far more secure and roomy than the one now used.
6. Three faces of the tent are covered, and the fourth may be covered by a blanket or odd piece of canvas.
7. No ridge pole is required.
8. The only ropes required may be used to tie up the bundle.
9. It is a superior wrapper for the bundle.

10. When not pitched it serves, on account of its peculiar form, as an excellent bed covering.

11. It is the only practicable storm tent, and to this point the Board particularly invite attention.

12. It forms a roomy and convenient 'A' or common tent, and as it can be opened at both ends, it can be rendered more comfortable in warm weather than the old tent.

13. Thirty-four (34) tents (officer's) or forty (40) tents (men's), with poles in suitably constructed bags, form a handy pack for a mule. The common tent is here referred to.

14. If transportation is abandoned, the tent is easily borne on the person.

15. It is readily adapted to a *wind* or *rain* storm.

16. The shelter tents are easily put together to form a *secure* storm or common tent.

In conclusion, the Board is of the opinion that if "Farrow's Portable Combination Shelter, Storm and Common Tent" is adopted, it will prove a valuable addition to the camp equipage now issued. * * * *

(Signed) C. T. ALEXANDER,
MAJOR AND SURGEON, PRESIDENT.

(Signed) EZRA B. FULLER,
1ST LIEUT., SEVENTH CAVALRY,

(Signed) E. J. McCLERNAND,
1ST LIEUT., 2d CAVALRY, RECORDER.

By furnishing a light and useful canvas, like the one above noticed, in connection with the system of 'campaign equipment' described in the last chapter, the soldier will be possessed of a *field equipment*, formed upon scientific principles and capable of practical use in every way satisfactory. The 'rolls' admit of being packed handily on pack mules, twenty on a mule. Before going into an engagement or becoming detached from the train, the mules may be readily unpacked and the men shoulder their 'rolls.' Ordinarily the 'roll' should contain the shelter tent and one blanket only; the other articles (one blanket and change of clothing) may be put in at the discretion of the commanding officer.

The following advantages of such an equipment are evident:

1. Each of the 'rolls' contains sufficient to make a complete shelter tent, a warm bed, and to afford each man a change of clothes.

2. The weight is comparatively little, being only ten pounds.

3. The weight is actually uniformly distributed over the body, and the shape and bulk of the combination are such as to permit its being worn without inconveniencing the soldier.

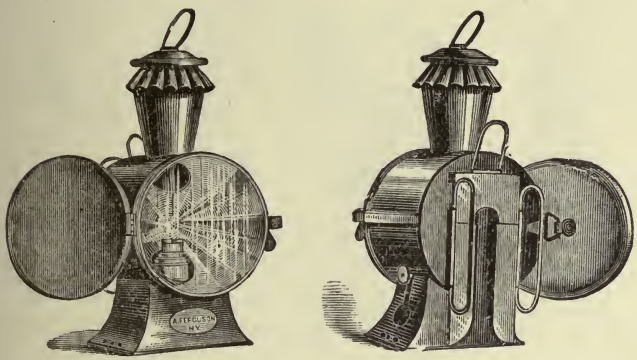
4. In the first moments of the skirmish, it furnishes a ready cover (by slipping it to the front and over the head), which will protect the soldier to some extent until the trowel bayonet has been employed. Two or three 'rolls' placed together will afford an excellent cover for two or three men.

When not engaged in forced marches, and when not compelled to leave the means of transportation, the men should bear only their rifles, ammunition, intrenching tools and, at times, canteens. The haversack and contents are useless and burdensome. It is not needed during an ordinary march, and is certainly in the way about the time of an engagement. A few pieces of hard bread placed in the hip pocket of the soldier do not incommode him and are always attainable; whereas, the haversack is often lost and oftener abandoned before the soldier has had an opportunity to appease his hunger.

In the engagement of the troops under Captain Evan Miles, near Umatilla agency, Oregon, July 13, 1878, eighty-nine of the men wore haversacks, thirty-one of which were lost and abandoned during the fight, and were missing on arrival into camp the same evening. In my opinion, there is no necessity for a haversack at any time.

As forced marches are frequently made at night, a suitable contrivance for giving light, when it is difficult to follow the

trail, is very desirable. The *Ferguson Patent Lamps* are excellent for all outdoor work.



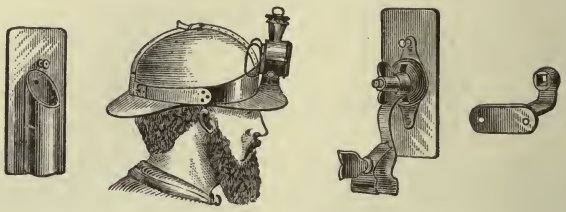
FRONT. BACK.

The drawing shows a combination head or staff jack, belt, dash, camp or hunting lamp and dark lantern, which I consider invaluable for night travel and camping purposes. Its weight is one pound, its dimensions 8½, 3⅞ and 2¾ inches. Its parts are regulated from the outside, and it is constructed so as to burn sperm, lard, signal or other mixed oils, without a chimney.

The flame cannot be extinguished by wind, rain or jolting, and is reliable in any weather. The cap or cover is used for obscuring the light when necessary, also for protecting the glass face in transportation, and may be taken off, if desired, by simply drawing out the hinge pin.

It has folding handles at the back and a metal loop, by which it may be hung in any desired position. By passing a strap or cord through an opening at the back, just above the handles, it may be attached to the waist. It is very useful about a camp, for the purposes of tent lights and for starting the camp fires in rainy weather; or, for night travel and hunting. There is almost no end to the uses to which it may be applied in the course of an extensive journey. The light is

sufficiently strong to enable a person to see at least eight rods ahead, and is reflected 250 feet or more.



By means of a socket attachment, the lamp may be adjusted to a stick or pole and properly placed for reading and writing at night. A person using this lamp is enabled to see very clearly in three or four feet of water, by adjusting a reflector to the face of the lamp, so as to catch the rays of light and reflect them downward.

The head attachment is made to fit perfectly any kind or size of hat, and so adjusted as to throw the light full on the object viewed. In night firing, it brings the light very close to the rifle.

The dash attachment not only holds the lamp in an upright position on a straight or curved dash; but the lamp may be attached to either the right or left side, or to the top of the dash, by simply reversing the arm.

The bracket attachment may be used for attaching the lamp to a wooden dash or pillar, and is adjustable to either an upright or horizontal position, and may be used either right or left hand.

Frequently, in consequence of the loss of pack animals and when it is necessary to reduce the loads in view of forced and rapid marches, articles must be left behind. They should be hid away or 'cached,' with the expectation of again taking them up. The articles are frequently 'cached' in caves, in rocks, or in the earth; sometimes, in the tops of trees with thick boughs, so that they cannot be seen from below. A

spruce tree will give excellent cover to anything placed in its branches. Care should be taken to remove all tracks or signs that would lead to the 'caches,' so as to evade the keen scrutiny of hostiles, and make them safe from animals that might destroy them. A small 'cache' may be made, in safety, by bending down a young tree, tying the bundle to the top and allowing it to spring up again.

As a general rule, the 'caches' should be made at a distance from all trails and points where hostiles or others are likely to pass, and should be secured by rocks too heavy for any animal to remove. The direction and distance of the 'cache' from some prominent mark, such as a rock, tree or the place of the fire (which will exist for years) should be recorded by the commanding officer.

Indians are very shrewd in finding whatever is left at or near a former camp or trail, and it is seldom that the inexperienced succeed in hiding anything away from them. A ruse frequently resorted to in order to cover up all sign of the 'cache,' is to pitch a tent over it and occupy the tent until all signs are effaced. By making a fire or picketing the horses over it, the same purpose is attained.

It is a very good plan to make two 'caches,' one containing a few things of little value and concealed with little care, the other containing the articles of value and made with all possible care.

After the first has been discovered, all further search in nine cases out of ten will be abandoned.

One of the best ruses, in this connection, that I ever practiced, was to make the 'cache' look like a grave, placing a stone or head-board appropriately marked. The ruse is generally successful with hostiles and is particularly sure with renegade white men.

When making 'caches,' it should be remembered that a heavy rain will cause the ground lately disturbed to sink.

CHAPTER X.

CROSSING RIVERS.

THE principal delays and difficulties encountered by a marching column in a mountainous country attend the crossing of numerous streams and rivers. The make-up of the column, and the nature of the stream and its approaches will, in general, decide the most proper mode of crossing.

Dismounted men may often save time and labor by leaping over deep and narrow streams or ravines, although it may be necessary to drive the stock many miles up or down stream before finding a suitable crossing.

If a pole eight or ten feet long can be secured, by a union of leaping and vaulting a wonderfully great distance may be passed over.

The planting of the pole and the spring should take place at the same instant, in order that the swing may be perfect and the upper and lower members act in unison. If the left hand is below, the leaper should spring with the left foot, and *vice versa*. During the swing upward the leaper should turn his body, so that when he begins the descent his face shall be directed to the place where the leap was begun. The descent must take place upon the balls of the toes, and with a sinking of the knees.

The leap may be made longer by forcing the body up very high, by pressure of the hands, (one of which is on or near the end of the pole) so that the leaper can swing over the top of the pole and allow it to pass between the legs while descending.

To transport the packs over such a deep and narrow stream or ravine, find, if possible, a tall, overhanging tree, unite the lariats or lash ropes and pass the rope over the fork of a high and projecting branch.

One end of the rope, after passing over the branch, is made fast to a limb or rock near the ground, while the packs are attached to the other end and swung across, being guided by ropes fastened to the swing rope and held by men on both sides.

After the swing rope has been once adjusted, it may be used for the purpose of swinging the men across.

A fallen tree or beam, across a stream or ravine, will often afford a good footway without an expenditure of labor.

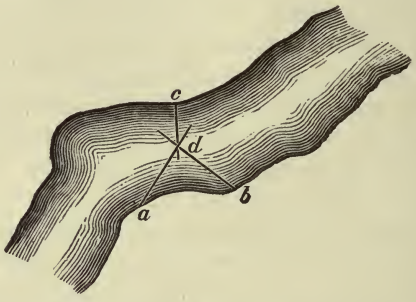
After a little practice, the men will be enabled to travel the beam or even a suspended rope with much ease and rapidity. The surest positions are, while traveling, in the rest sideways (keeping the body in an upright position), and riding over the beam sitting astride (forward, sideward or backward).

In case of giddiness, it is well to lean forward, clasp the beam with the arms and move along in a lying position.

The suspended rope may be easily traveled in the balance rest, crossways and sideward, or forward and backward hanging by the hands and legs, the latter either locked or moving in unison with the hands.

When the stream is too wide to be spanned by a single tree, a good footway may be secured by felling several trees,

judiciously selected on each bank. The tops of the trees should point well up stream. Thus, the trees *b* and *c*, selected so as to cover the most sluggish portions of the current, have their tops closely interlacing up stream, in consequence of the current at *d*.



The additional trees like *a*, are selected so as to strengthen the work, being made fast to the banks further up stream. In this manner, the foundation for a temporary bridge over a wide and deep stream may be quickly and readily made.

The quickest and most convenient mode of crossing such rivers as will permit it, is to ford them; and the selection of the safest place for fording is a matter of some practical importance. The depth of the ford should not exceed three feet for infantry, nor four feet for cavalry, and its bottom should be firm and even. For a small party, one of hard sand or gravel is the safest; but a sandy bottom is very bad for a large number of men or animals, as the sand is stirred up and carried away by the current and thus renders the ford impracticable for the hindmost.

In hunting a suitable ford, follow the windings up stream rather than down, where tributaries are continually putting in and increasing the volume of water. As a rule, a stream presents few fordable places in the winding portions of its course, except in the case of double bends. It usually runs deep along hollow curves and beneath steep and overhang-

ing banks, while all projecting points (except jutting rocks) have shoals extending from them, with frequent return currents on the upper side. A road or 'trail' starting from each of the opposite banks, will generally indicate the existence of a ford ; but a 'trail,' on one side only, often indicates merely a watering place of animals.

The best ford seldom leads directly across a stream, but must be selected at a point where the width of the stream is greater than usual with the point of egress some distance down stream, in order that those crossing may secure the advantage of the current. In certain cases, however, owing to the formation of the river banks, it is necessary to ford obliquely up the stream. This is always attended with much labor and difficulty, and frequently in the struggle with the current the footings of men and animals are lost. In such cases, it will accomplish much if mounted men are placed at suitable points, to urge forward with whips any animals that do not work properly. To insure reaching the proper point of egress, some of the animals will need frequent assistance by means of attached lariat ropes. When the river is deep and rapid, in consequence of the body's buoyancy diminishing its power to resist the action of the current, it might be well to place a heavy rock in the arms before entering the ford.

When the different arms cross a ford separately, the infantry should precede the cavalry and artillery; otherwise they would destroy the bottom and render the crossing for the infantry difficult or impossible. While fording, it is important to direct the eyes to some fixed point upon the shore and not look at the water, and particularly when the water-course is broad or the current rapid.

It is imprudent to trust too much to fords in brooks and rivers in mountainous countries where they are subject to sudden variations.

When the snow begins to melt in the spring, the moun-

tain streams rise rapidly, and on sandy bottoms the torrents of water are continually cutting new channels many feet in depth. Where there is a bar in the morning, there may be ten feet of water at noon and a bar again at night.

The currents set in all directions relative to the course of the stream, and cut innumerable channels with very steep sides. It is extremely dangerous to attempt the crossing of such streams—one moment stepping in water a few inches deep; the next, being in swimming water and struggling for a footing on the bar but a short distance beyond.

Many of the Western streams flow over large beds of quicksand and must be approached and crossed with the greatest caution. There are several varieties of quicksand: the less dangerous classes appear to have no bottom, there being an absence of everything except sand and water—while the more dangerous are those which catch and tenaciously hold the victim, allowing him to slowly sink out of sight and cutting him off from everything except external assistance. These sands, however, generally have a firm surface and will give sufficient time for warning to any one on the alert. On arrival upon the bank of such a river, the best track for the ford should be carefully selected by men on foot. The footmen, if any, should cross before the animals, thus making the ford more secure by packing the sand. The stock should be watered before entering upon the ford, and under no circumstances permitted to stop in the stream.

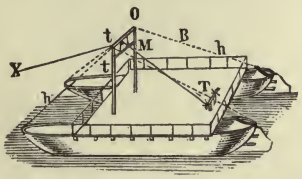
Most animals, and particularly mules, on feeling their feet sink in the sand, become alarmed with fear, loose all control of their power, and sooner or later lie down and make no effort to get on their feet again.

Beaver dams are generally found in muddy places, and it is a good rule to be on the lookout for mire in their vicinity.

Unfordable streams may be readily crossed by means of flying bridges or rafts, when there is sufficient current and when ropes and timber are handy.

The flying bridge or raft may be successfully navigated by attaching it to a swinging cable made fast up stream; or, by making it fast to a traveler running on a cable stretched across the stream. In the first case, the lower end of the cable should terminate in a bridle. On leaving the shore, the end of the bridle farthest from it is gathered in, while the other one is slackened, and the raft shoots across the stream. To re-cross, the end of the bridle farthest from the shore is hauled in and the other again slackened.

The same may be effected by means of rudders, the cable



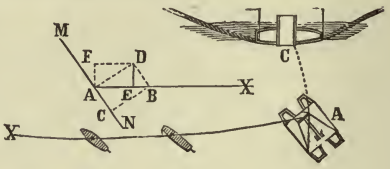
being made fast to the raft about one-third of its length from the bow, while it is kept headed obliquely up stream. The principle of action in this case is the same as that of a kite in the air.

In the second case, the cable stretched across the stream must be carefully secured when the current is great. The maximum pull of the raft will be $S V^2$, in which S is the area of the immersed side of the raft in square feet, and V the velocity of the current in feet per second. To insure proper progress, the velocity of the current should not be less than two miles per hour.

Referring to the following drawing, the component of the force of the current which tends to force the raft directly across the stream may be readily traced.

If the raft is kept on the course M N, and the current is running in the direction A X, it is plainly seen how such a

force, A B, is divided into two components, A C and A D, acting parallel and perpendicularly to M N.



The component A D is again sub-divided into two components, A E and A F, acting parallel and perpendicularly to A X.

D E = A F is the component of the power of the current tending to force the raft across the stream.

To produce the best effect, the side of the raft should be kept at an angle of 55° with the direction of the current, or B A C = 55°.

The cable may be taken across the stream by a swimmer, or by means of a lobstick—made by splitting a stick, inserting a rock or pebble and lashing the stick with twine. A small line is first made fast to the cable, the end of which is sent across; whereupon, the end of the cable is drawn over. Under certain circumstances, the small line may be sent over by means of an arrow, rocket or kite.

The mountain streams, during the seasons of high water, remain above the fording stage for several weeks, and often render it necessary, when time is an important element, to cross them by swimming or ferrying rudely constructed boats or rafts.

Timber rafts may be quickly constructed in a wooded country. The size and description of the timber must determine the number of layers there should be.* The tim-

* The cubic contents, in feet, of round timber = L ($G^2 \times .07958$), in which L = length of the log in feet, and G is the mean between the girths at both ends in feet.

The floating power of any log may be readily calculated when the specific gravity of the wood is known.

ber for rafts should be floated, if possible, to the place required and put together in the water.

The Indians use '*bull-boats*' for crossing deep rivers. The frame-work is made of willows, cotton-woods, or any small trees that grow along the banks of the streams, firmly lashed into the shape of half an egg. The frame is covered with a green or soaked hide and left to dry. Several hides may be sewn together so as to cover quite a large frame. A boat constructed of three hides will transport 1,000 pounds with perfect safety. The Indians of the Northwest often

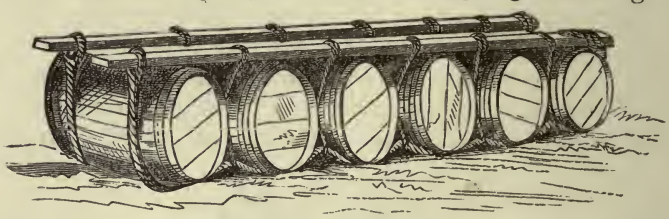
use dug-out canoes and logs lashed together; also canoes made of bundles of reeds and cedar bark, with projecting prows, very much resembling some of the iron-clad rams.

Colonel R. C. Buchanan, of our service, invented a *portable boat*, made in sections, which was used to good advantage in several expeditions in Oregon and Washington Territory. A single boat, with all its appurtenances, capable of sustaining ten men, could be easily packed on a single mule.

Frequently the supplies, in part, are transported in casks; if so, it is a simple matter to construct a *cask raft*, which will do remarkably good service. If the number of gallons that a cask will hold is known, its buoyancy may be easily ascertained by multiplying that number by ten (the number of pounds weight in a gallon of water). Casks are so useful for packing puposes, so easily and safely transported, and form such admirable rafts, it is difficult to conceive, where transport is a serious matter, of a more economical preparation for crossing unknown rivers on wild expedi-

tions. The larger the casks (consistently with ease of packing) the better, as the weight will be smaller in proportion to the buoyancy.

To make the raft, the casks are placed in a row, side by side, with the bungs up; two rails or saplings called gun-



nels are laid along them about four inches from each end. Slings of strong rope are passed under the casks, from end to end of the gunnels. The ends of the sling should be made fast to the gunnel, by means of the *bowline* and *fisherman's bend*. Between the casks there are brace lashings, as shown in the drawing. In the absence of sufficient rope the gunnels must be nailed or spiked to the casks; but the use of nails or spikes in rafts or floating bridges is to be avoided when possible, as they admit of insufficient play.

To determine the number of casks required to construct a raft that will support N pounds, find the solid contents of one cask in cubic inches and multiply it by the specific gravity of water. From the product subtract the weight of the cask, the remainder will be the weight it will support without sinking. Take a sufficient number of casks to bring this weight up to N pounds.

In emergencies, the tents and paulins, when securely lashed over suitable frames of boxes, aparejos, etc., will form very good ferrying rafts.

See Appendix for the analysis of *Rowing*.

When there is no time or material for building a raft, the supplies should be wrapped as nearly water-tight as possible in the canvas and rubber blankets of the command, and towed across by the swimmers.

By resting the body on a log of light wood, if obtainable, it will be well supported and the crossing rendered much easier. If the part of a tree near the roots be selected, the stumps of the roots will form pegs on which to hang the clothes, supplies, etc.

All soldiers should know how to swim, in order to be effective and perform various important services. A command consisting of troops who cannot swim, may be retarded by an insignificant stream, if not completely paralyzed in its operations. The emergencies requiring a knowledge of the art are of daily occurrence. Time and again have insignificant streams swollen into plunging torrents, without any warning whatever. Numerous lives have been lost by the sudden appearance of sweeping streams of water, where a few moments before nothing but dry earth could be found. Whole commands have been carried away by sudden raises during the night, although the camps were made upon the banks many feet above the usual water-level.

The following extract from the report of a commanding officer, who experienced such a washing out, although encamped where, the day before, there was no sign of water, will serve to illustrate :

" The only thing that prevented total destruction was the fact that my camp was surrounded by a belt of timber on three sides, and as the men were carried off by the current, they were enabled to save themselves by catching the limbs of trees. When day broke, it showed almost all the men of my company on the tops of the trees, without any covering except remnants of underclothes, and beneath them the torrent still raging. After the lapse of a few hours, the water began to fall, and a few men who could swim got to the hills. Afterward the others, myself among the number, were got off with life lines and various other means. Up to this time nothing was to be seen of what had been my

camp, except the top of an army wagon, which had stuck to a log on the ground, and on this wagon were collected eleven men, who were thus saved from a watery grave. Six men of my company were drowned and twenty-six horses lost."

A complete SYSTEM OF LAND-TAUGHT SWIMMING, originally prepared by the author for the instruction of the Cadets at the United States Military Academy, is inserted in the Appendix.

Great care must be exercised when swimming the stock. Suitable points of ingress and egress (the latter at least a distance equal to the width of the stream below the former, if possible) are first selected.

At the point of ingress, the bed of the stream must be firm, or else made so by throwing in brush, timber or rocks, in order to prevent bogging or miring. The point of egress must furnish a point of support upon which the animal can place his hind feet, just before springing upon the bank.

If the soldier can swim, he should drive his horse into the water, seize his tail and guide him to the point of egress—splashing water in his face, should the animal endeavor to turn his head or change his course. If the soldier cannot swim, he should make himself fast to the saddle, lay hold upon the mane, ride into the river and give his horse a loose rein.

The plan of having each horseman carry a footman mounted behind will often prove successful. It was in this manner that the Necker was crossed by Marshals Turenne and Gramont in 1645.

When there is danger of the horses drowning, should they land beyond the point of egress, the following plan, provided the current is not too strong, should be adopted:

Let a few of the swimmers cross the river, taking with them one end of a rope (made by uniting the lariats or lash ropes), the other end being retained at the point of ingress

and made fast to the neck of a quiet and easy swimming horse.

The horses are then brought up in succession, and each made fast to the tail of the horse preceding, by means of lariats, until they are all tied together.

When all is ready, the first horse is carefully led into the water (followed by the others) and started on a line for the point of egress—the men on the opposite shore pulling in the rope and helping him to stem the current. As soon as this horse strikes bottom, by pulling those behind him, he assists them in landing. The men who cannot swim at all should be tied upon the best swimming horses and sent over.

When the current is not very strong, I believe it is safer and more satisfactory to swim along with the horse, on the down stream side, and only very poor swimmers should remain in the saddle, as the animal is very apt to lose his equilibrium and roll over.

Mules are splendid swimmers, unless by accident they get water in their ears. When this happens they cease to move and drop their ears, and unless gotten out of the water at once will drown. They should be permitted to enter the water slowly and without crowding, or they will probably submerge their heads. If the *bell mare* be first taken across, the mules will follow without much urging.

When the animals are tied together, as above described, great care must be taken to keep them all straight on the course across the stream, or a serious accident may result. If some swing out of the course an entanglement may sooner or later follow, or the animals may rapidly travel down stream, swimming round and round in circles. When such happens, good swimmers must hasten to the rescue and cut the ropes at close intervals.

CHAPTER XI.

The Camp.

A locality well sheltered and secured, and affording fuel, grass and fresh water, should be selected for the camp.

If it is expected to remain in the camp for any great length of time, its sanitary condition must be carefully observed. All ponds, swamps, lands recently stripped of their timber, and muddy rivers must be kept at a distance. In a malarious district, it is well to habitually sleep between two fires.

The flood level of the nearest water should also be carefully noticed—weeds and stray bits of drift-wood washed into the branches of adjacent trees or bushes will serve as a guide. Many streams are subject to sudden and terrific rises, and frequently without any apparent cause.

When camping for the night on a fordable stream, with the intention of crossing, make it an invariable rule to cross it before going into camp. A sudden rise or appearance of the enemy might seriously interfere with the crossing next morning.

Wind storms are a common annoyance in the camp. When there is time to prepare for their coming, the tent pegs should be secured and sufficient guy-ropes attached to the tent. If the soil is loose and sandy, rocks or other hard material should be placed under the tent poles to prevent their working into the soil, and leaving the tent slack and unsteady—the pegs should also be inclined toward the tent

and driven in the direction of the prolongation of the tent cords (if they are inclined from the tent, they will soon be jerked loose). When the pegs will not hold at all, fasten the tent cords to brush or rocks buried in the soil.

A few trees add very much to the comfort of a camp, and when they are so situated as to permit the guy or ridge

ropes to be made fast to them or their branches, the wind storm need not be dreaded.

So far as may be prudent, the camp should be protected by bluffs and thickets, and the backs of the tents should be placed towards the wind. It is not wise to camp beneath certain trees, whose branches are liable to suddenly fall off.

In a hostile country, the security of the command will depend very much upon the judicious selection of a camp as regards its capability of defense. If on the bank of a stream, a concave bend, where the water is deep, should be selected. In such a position the defending party can cross his fire in case of an attack from the other bank, or can herd the stock in the concavity of the bend in order to avoid a stampede. When the camp is remote from a stream or river, a portion of it should rest on the highest hill or bluff within range. As a rule, the tents should be pitched on that side of the camp most exposed to attack. When the packs and aparejos are removed, in camp, they should be arranged so as to form a fortification in case of need.

Skunks and rattlesnakes frequently visit camp.

The skunk, when hungry, is quite fearless and will not hesitate to enter a tent in search of food, or to attempt to devour the face or hand of a sleeping person. Instances are not rare in which their bites have resulted in a most fatal and horrible hydrophobia.

At first frost, rattlesnakes commence a pilgrimage, *en masse*, across rivers and lakes, up and down mountains, to their winter rendezvous (some inapproachable cavern) where hundreds assemble and remain in the torpid state during the winter. The male and female go out in company upon their summer's peregrinations. The two are never found together, but are within hearing of each other's rattle and display a wonderful instinct in tracking each other. The Indians take advantage of this and ingeniously trap them, before they reach their blankets. Having prepared an old log by removing its central portion, so as to leave an open-

ing sufficiently large to permit the snake to crawl through, but not to turn around after having once entered, the dead snake is dragged along the ground up to the log and then through it. The further end of the log is then closed by means of nails or wooden pegs. It is not long before the companion snake trails the dead snake, and enters the log; where, being unable to crawl through, turn around or back out (in consequence of the backward inclination of his scales), he is retained in a helpless condition for any length of time. The snake usually strikes after the warning of the rattle—a peculiarly hollow death-like sound—from an elevation of about one-third his length, after coiling up the

body. He is very susceptible of cold and, at night, will

crawl into a tent or shanty and coil up near the fire or in the bedding.

As a usual thing, venomous snakes congregate close to the water. If holes are discovered in the ground, in the vicinity of the beds, it will be well to stamp the earth and rocks into them, as they are frequently the burrows of various reptiles.

When hostile Indians are supposed to be about, the place selected for camp should be carefully examined on all sides, in order to discover any tracks or Indian signs, before removing the packs or unsaddling. It is a favorite trick of the Indians to stampede the animals upon first arrival in camp, when the attention of every one is preoccupied and more or less confusion reigns. They seldom attempt a stampede at night, preferring the day-light for such work, and invariably select the early dawn of day or some moment when the command is in a probable state of confusion.

A stampede is one of the most dreaded disasters that can happen. Frequently, the animals are not only widely scattered, but irretrievably lost; and much damage follows the rush of the infuriated herd through the camp, frequently trampling the men and tents, and killing themselves by coming in contact with trees and projecting rocks.

When attempting a stampede, a few Indians will sometimes steal into camp, go to the bell mare, remove the bell, place it on one of their fleetest animals and ride out of camp (before noticed) followed by the entire herd. Again, they sneakingly approach as near the herd as possible, and dash into it, with their horses at full speed, at the same time terrifying them by the most hideous yells, and succeed in driving off the stock before any effectual resistance can be made. It is often effected by starting an Indian pony into the herd or camp, with a buffalo robe dangling at his heels. The alarm is soon communicated to all the animals. When the herd is once started, it is pushed forward as rapidly as possible for a few days, so as to make distance between it and the pursuing party, while many Indians pass to the rear to offer resistance to the pursuers, if close at hand.

Horses, and especially mules, that have been once stampeded, cannot be trusted beyond the control of the herders. They will, at very unreasonable moments, stampede in the most frantic manner without any apparent good reason. Even the passage of a deer, wolf, strange horse or herder among them will cause them to take alarm and scatter all over the country. The herders cannot be too diligent; they should at all times be ready for any emergency, and when the animals take fright they should hasten with the bell mare in advance of them and gradually turn them in the direction of camp.

The stock should not be tied up to a picket line unless an attack is anticipated; for, when unable to forage at night, they soon become weak and unserviceable. They should be so herded during the day time, as to leave a sufficiency of good grass *near* the camp for night grazing. When however, it becomes necessary to picket the animals, they should be placed upon the best grass and their places changed every two hours. The picket rope should not be less than 10 or 12 yards long, and should not be made fast to a tree,

or it will twist and wind about it, as the animal feeds around it. The rope should be so attached to the animal's neck as not to slip and choke him. For wild horses, the ordinary hobble (page 113) is more satisfactory. The *side hobble* (made by buckling a strap around the fore and hind leg, on the same side) affords a still more effective anchorage, as the animal can not well move faster than at a walk.

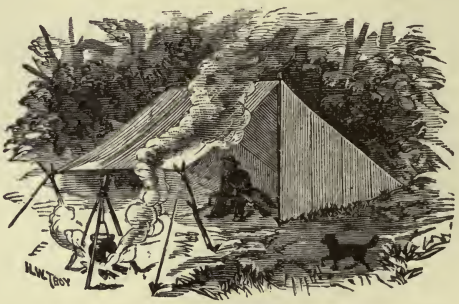
Immediately upon going into camp, pickets should be posted in strong positions, and sufficiently close to the camp, to give timely alarm in case of the enemy's approach. The picket should be posted, during daylight, on some eminence near the camp, where he can keep a lookout in all directions. During the night, he should be posted several hundred yards farther in advance of the point subject to attack and on *low ground*, in order that he may be screened from observation, and at the same time see to the best advantage, as low objects will then appear high and stand in bold relief against the sky;—moreover, in timber, it is easy to see a great distance between the trunks of the trees, while their tops and branches hide all objects beyond. If the picket discovers the enemy and is not seen himself, he should quickly withdraw and report the facts in order that no time be lost in preparing for action. But, if the picket is discovered by the enemy, he should first discharge his piece and then retreat. To save time and avoid all false alarms, a well defined system of night and day signals should be devised before going into the Indian country, and thoroughly understood by every picket. In this way, they could very readily communicate their discoveries to the camp.

In consequence of his very acute senses of hearing and smelling, a mule will discover the approach of any one, much sooner than a man. I consider it a good plan, in many cases, to send a mule out with each picket, having taken the precaution to prevent his braying; he will not only act as a good sentinel, but will serve to carry the picket into camp with the alarm.

On a very dark night, it might be a good plan to set an alarm gun (for ways of setting it, see page 210.) Even the click of the hammer might serve to call attention.

A spot should be selected for the stock at night, close to which there are no unguarded clumps of brush or thickets, as the Indians often take advantage of such cover to shoot or steal the animals, before their presence can be observed.

So far as is practicable, the fires should be placed to the leeward of the camp and grazing ground, to avoid accidents and the frequent attempts of Indians to set fire to the grass, in the vicinity of a camp, when it is too strong to be attacked. The fires should be so placed with respect to the tents



that the smoke may be carried away by the wind and cause no discomfort. It will not do to be fastidious in making the camp fire. It should be so constructed as not to smoke in the face or tent, not to be seen from the distance, to be quickly extinguished, to admit of many gathering around it, and at the same time economize fuel. An Indian builds a small fire and sits near it when warming his body; a white man usually builds a large fire and can not get near it. As a rule, if warmth is desired, see that the fire is kept close to the ground; if light is wanted, elevate it 1½ or 2 feet above the ground. To cause large logs to burn brightly, air should reach them on all sides.

In wet weather, sufficient dry fuel to start a fire may be found, in most cases, under logs, rocks or leaning trees. When no dry place can be found, the fire should be started in a pan or kettle and then transferred to the ground.

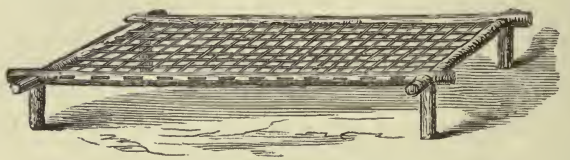
Fuel is scarce in many localities and particularly at the lower ends of canyons, where the bottoms widen out and where there is but little protection from the wind. '*Sage-brush*' and '*Grease-wood*' are frequent substitutes. '*Buffalo chips*,' when dry, burn well and are easily lighted. '*Sea weed*' makes a very hot, but not a cheerful fire. An excellent substitute for fire-wood is '*bones*,' even those of an animal freshly killed. The bones of cooked meat give a fire of great intensity, with a flame depending on the fat in them, and an odor no worse than that of charred meat.

Every precaution should be taken against setting the grass on fire, and places sufficiently large for the fires should be cleared away. When the grass is dry, it will burn like tinder; and if the wind be blowing, the flame will rapidly spread and sweep every thing before it. It is a frequent misfortune to have the supplies and equipage destroyed in this manner, besides stampeding the animals, destroying their food and announcing the position of the camp to any enemy on the alert for smoke, etc. If by accident, the fire starts, the men should lose no time in fighting it with brush or blankets (wet if possible) and throwing sand upon it, if at hand. It is often necessary to start counter fires and burn around supplies and other places in order to save them from the flames. The fires are extremely dangerous in canyons and other places where vegetation is abundant and the grass very high.

Good grass is one of the most necessary elements of the camp. All graminivorous animals, except the elk and deer, prefer the '*buffalo*' and '*bunch grass*' to that of the lowland. '*Buffalo grass*' is very short, but nutritious—it becomes thoroughly cured during the summer and is a favorite in

all seasons. '*Gramma grass*, found upon the mountain sides, and growing to the height of one or two feet, is an excellent variety of '*Buffalo grass*.'

By scraping a hollow in the ground, about where the hip bones would otherwise press, and covering with several thicknesses of this grass, a most luxurious bed may be formed. If time will permit the construction of a frame, lashed with thongs, ropes or raw hides, as shown in the



drawing, and it is well covered with grass, the perfection of camp beds will have been attained. The grass secured for the bed, will serve as an extra meal for the horse, while preparing to move the camp.

The stock will willingly eat the bark and branches of *cotton-wood trees*, when the snow is too deep to get at grass.

Water is generally found in abundance in most mountainous districts either in the beds of streams, in springs or in openings in the rocks. In sandy countries, the beds of the apparently dried up water-courses should be carefully explored for water near their sources. Water is frequently found under stones in the deepest parts of the bed. Tracts of low land, on which green grass, reeds, water-plants, cotton-wood or willow trees are found, should be carefully examined. In the partly dried up water-courses, the most water will be found at the points where the tributaries put into the main water-course. In a country where deer and fowl abound, water may be generally located by observing the points to which the trails seem to converge and toward which the wild fowl direct their movements just before evening.

Horses, mules and dogs exhibit a wonderful instinct in finding pools of water where it would scarcely be expected to exist.

Trees and water generally go together in sections of country where timber is very scarce.

Water may be secured in large quantities during a rain shower, by catching the drippings of the tents, and by suspending pieces of canvas and blankets by the corners and placing small weights on their centers. It may also be collected by dragging the blankets over grass, wet with dew, and then wringing out the water that has accumulated. This should be resorted to only in cases of necessity; and as a rule, the stock should not graze on grass covered with dew.

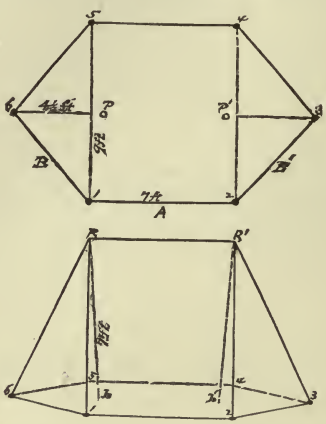
It is not well to drink water that is putrid or charged with salts, as they do not quench the thirst, but increase it and produce fevers and dysenteries;—in such localities, the best remedy is to bathe in the water.

The tents usually used in field service or hasty marches are the shelter tents already described and the 'A' or com-

mon tents. The drawing shows the ordinary 'A' tent composed of a single piece of canvas, which in consequence of its weight is not so well suited for light travel as the author's combination 'A' tent described on page 145.

I have received from *Gilbert Thompson, Esq.*, the designs of a tent that offers many advantages over the heavy tents

that are, at present, used. With a weight of 24 pounds of canvas (10 oz. duck), it covers over 100 square feet of ground, and is so constructed that one man may easily put it up and take it down. It affords ample accommodation



for 6 men (within the space 1245), with end spaces (165 and 234) sufficiently large to receive a small stove and valuable boxes. It is without annoying guy-ropes, and possesses many advantages of ventilation, when any of the sides *B*, *A*, or B^1 are raised; and may be so pitched as to expose one of the angular faces 6 *R*, or 3 R^1 to the wind. Another great advantage over the 'A' tent is that it affords a greater *available* space, for the same weight of canvas.

The ground plan and the dimensions, also a perspective view of the tent when pitched, are shown in the drawing.

The tent, and especially during the summer months, is not the most important article of equipage. It is seldom that injury results from simple wetting, if the body is freely exposed to the open air.

It is absurd to take chairs and tables in the field—a '*dig out*' in the tent will serve to make a table and seats, the feet and legs of the person being placed in the trench.

If possible, a level spot snould be selected for the tent or bed, and when the wind is high, it should not be placed near a single tree, as this is apt to create a violent eddy. This may be frequently observed in a corn-field after a wind storm, the stalks being knocked down in circles around isolated trees, while elsewhere they remain standing.

Sleeping in hollows and slight canyons during quiet weather is not wholesome, as cold air pours down into these from the higher ground. Horses are frequently noticed to draw up to the surrounding plain, where the frosts are less severely felt as the night sets in. If compelled to sleep on the snow, it should be piled upon each side, and if possible the face and ears should be smeared with oil or grease.

Remembering that the favorite times for an Indian attack are at sunrise or sunset, or when coming out of or going into camp, it appears most proper to have reveille about 4 A. M., so as to have the column in motion by the dawn of day.

There is nothing more annoying about the time of breaking camp than the difficulty experienced in bridling wild stock, or the delay occasioned by the loss of such animals as are prone to stray off from camp. A good way to catch a refractory animal is to have two men stretch a long rope about the height of his neck, and while other men drive the animal against it, let one of them, with the rope, run round behind the animal, and quickly make a turn about his neck. In turning the wild stock out to graze, it is a good plan to leave the lariat ropes upon them, the ends trailing on the ground.

If time be an object, it will be better to leave lost mules behind (when their services can be spared), for they will, in consequence of their very acute power of smell, trail the stock and follow to camp. A *bell mare* of quiet and regular habits is indispensable in the camp—serving to keep the herd together and close in hand.

CHAPTER XII.

THE MESS.

Good powder is no more a munition of war than good food.

One of the principal elements of success in cooking is the proper provision of the few most indispensable articles of kitchen and table furniture. For every six persons, there should be supplied one camp-kettle (the kettles being of such sizes as to admit of packing one within the other, and the smallest one large enough for making soup or coffee); a heavy tin coffee-pot; ten tin cups, with revolving handles; ten strong tin plates; one wrought-iron frying-pan; one wrought-iron bake-oven; one heavy tin mess-pan; one strong water bucket (wooden buckets to be avoided); one extra small camp-kettle; ten knives, forks and spoons, with iron handles. One spade, axe, hatchet and chopping-knife should accompany each mess kit.

The mess boxes must be prepared with a view to their being transported on pack mules, if necessary; and when taken two together, should form a handy pack. The boxes may be readily constructed so as to form convenient tables, when the lids are thrown open.

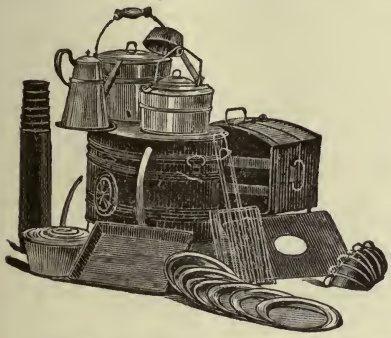
Matches should never be transported in the mess boxes, unless they are placed in tin boxes or tightly-corked bottles.

The frying-pan is the most invaluable of all cooking utensils. It may be made to serve a host of purposes—fish and game may be cooked in it, stews prepared, flapjacks made, coffee roasted, etc. The handle should be detachable, or have a 'parasol joint' made close to the pan, so that it may be folded across it.

I consider a handy camp stove a great luxury in the field,

and I know of no good objections urged against them, whether the party be large or small. Dunklee's Camping Stoves are excellent in every respect.

The drawing shows a very desirable stove for officers' mess, cooking for two or four persons.



Dimensions, Packed, 9½×12×13½.

When packed for transportation, all the apparatus is inside. The total weight is 22 pounds.

The 'CENTURION'—*Field Stove, Baker and Mess Kit complete*—invented by Captain Clifford, of the Infantry, is well recommended by all who have used it. It is 30×20×13 when packed for transportation, and will cook and bake for 100 persons.

Below is represented an excellent stove for a detachment of ten or twelve men.

Dimensions, Packed, 12×12×24.

While very durable, and especially adapted to camping purposes, its weight is only 35 pounds, and its dimensions are such as to permit it to be enclosed in an ordinary hard-bread box.

The ware is so constructed that it nests and packs in the oven, which has a capacity sufficient for roasting 20 pounds of beef. The oven packs inside the stove, and leaves sufficient room for packing the plates, knives, forks, spoons and drinking cups. This stove boils, bakes or broils; and when fuel is scarce, its excellence is very apparent, as it requires so little. In cold weather, it may be placed inside the tent, where it is a great luxury and saves much trouble.

When without a stove, and it is necessary to cook for a large party, using but little fuel, prepare a narrow trench, with one end open to the wind, building a small chimney arrangement at the other. After making the fire in the trench, place the pots and kettles in a row over it.

There is a great deal of art in kindling a spark into a flame, and it should be remembered that "*small sticks kindle a flame but large ones put it out.*" The surest plan, when starting a fire, is to place three logs with their ends crossing each other, so that each may support the combustion of the others. As the ends burn away, the logs should be pushed closer together.

The fire may be frequently encouraged by introducing the saltpeter existing in great quantities in the ashes of many plants, such as dill, sunflower, etc.

To insure success in cooking, accurate measurement, proper mixing and preciseness in the preparation of ingredients are very important.

The following are approximate weights and measures :

Three teaspoonfuls ---------- = One tablespoonful.
Four tablespoonfuls ---------- = One wine glass.

Two wine glasses	=	One gill.
Two gills	=	One cup.
Two cupfuls	=	One pint.
One quart sifted flour	=	One pound.
One quart powdered sugar	=	One pound, seven ozs.
One quart granulated sugar	=	One pound, nine ozs.
Seven tablespoonfuls of same		One-half pint.
One pint closely packed butter	=	One pound.
One tablespoonful salt	=	One ounce.
Ten eggs	=	One pound.

The drawing shows a convenient form of scales for the

use of cooks. These scales may be readily transported in the pocket, and will do away with all guessing at proportions, the practice of so many indifferent cooks.

Those desiring a more complete chapter on this subject are referred to the "Manual for Army Cooks," from which much of what follows is taken :

METHODS OF COOKING.

Roasting is that process by which a substance is acted upon by the heat of a fire, without interposition of utensils, and generally in the open air.

Baking is that process by which a substance is acted upon by heat in an oven. The temperature of the oven is usually about 400° Fah.

Stewing is that process of cooking by which the substance to be cooked is placed in a small portion of fluid and cooked slowly by simmering.

To simmer is to boil slowly, and is accomplished by removing the liquid so far from the fire as to keep it up to a very slow-boiling point.

At high altitudes the boiling point is so low that it is difficult to cook vegetables, with pure water, at all.

Rapid boiling should be carefully avoided, as no additional heat is developed by it and much of the aroma of the immersed body is lost. On boiling such articles as beans and pease, it is very desirable to use soft water.

Broiling is that process by which the substance to be cooked is acted upon by the direct heat of the fire, with only the interposition of a gridiron or some similar apparatus. The fire should be clear and free from smoke.

It is much better to broil before a fire than over it, as in the former process the juices of the meat can be caught in a dripping-pan, and used as a dressing.

The article should be turned frequently, so as to have both sides cooked alike.

Frying is that process by which the article to be cooked is immersed in hot fat.

Fat raised to 400° Fah., is sufficiently hot for frying purposes ; and such is the case when small jets of smoke are observed to issue from the top of the fat.

Sauteing is that process of frying by which a substance is cooked in a frying-pan or skillet, with just sufficient grease to cover the bottom of the pan. The grease should be frying hot for the purpose. Salt and pepper should always be used sparingly until after the food is prepared.

SOUP.

The principal nourishment of meat soup comes from the raw meat. Failure in making soup is generally owing to rapid boiling and neglecting to skim the pot. The pot should be kept covered while the soup is cooking, except when it is necessary to skim and add the necessary ingredients. If cooked meat is to be used, it should be added after the soup has cooked nearly an hour.

When vegetables are used, they should be added about one hour and a half before it is cooked or only in time to become thoroughly done.

Potatoes are an exception ; they should be put in one-half hour before the soup is cooked.

Beef, Elk or Deer Soup : Time, three hours.

Fifteen pounds of meat cut into small pieces ; about two cans of vegetables or three pounds of fresh vegetables ; six tablespoonfuls of salt and one-third as much sugar ; one pound of rice ; two pounds of hard bread ; two and one-half gallons of water. Let it simmer gently and remove the fat.

In all soups, the vegetables may be varied according to season and opportunity, using onions, potatoes, carrots, turnips, parsnips, cabbage, green or canned corn, fresh or canned tomatoes, celery or celery seed, cauliflowers, okra, rice, pumpkins, squash, green pease, string beans, &c.

Tomato Soup : Time, one hour.

Three pints of cold water ; three pounds of fresh or canned tomatoes ; one onion, chopped fine ; one large spoonful of sifted flour ; a piece of butter the size of an egg ; pepper and salt.

Prepare the tomatoes and mix the flour and butter into a smooth paste. Place these together with the onion and a teaspoonful of salt into a kettle with the water, and stir frequently to dissolve the tomatoes and to prevent them from scorching. One pint of boiled milk, if procurable, will benefit the soup very much.

Rice Soup : Time, six hours.

Four pounds of fresh lean beef ; two pounds of soup-bone ; one gallon of cold water ; one onion, sliced ; three-quarters of a pound of rice ; pepper and salt.

Put the meat and bones into a pot with water, one tablespoonful of salt and the sliced onion, and cook. Three-quarters of an hour before the soup is cooked strain it through a colander, return it with the good meat to the pot. Stir the rice into the strained soup thirty minutes

before it is cooked; stir frequently to prevent it from scorching or sticking to the bottom of the kettle.

Bean Soup: Time, three hours.

Two quarts of beans; one pound of salt pork; six quarts of cold water; one teaspoonful of bicarbonate of soda; pepper.

Pick over the beans, wash and soak them over night in cold water, and cut the pork into thin slices. Place the beans, with the allowance of cold water and bicarbonate of soda, into the kettle, cover it, heat gradually and boil for thirty minutes; remove the scum as it rises. Turn off the water and replenish with six quarts of fresh boiling water. Cover again and boil gently for one and a half hours, stirring the beans frequently; then put in the sliced pork. As soon as the beans become tender and crack, take out the pork and mash the beans into a paste. Remove the skins of the beans, replace the pork into the kettle and complete the boiling.

This soup is much richer when a half pound of lean beef, for every quart of water, is added. If bicarbonate of soda is not used, it will require a much longer time to make the soup. Frequent stirring is necessary to prevent burning.

Venison Broth: Time, four hours.

Five pounds of lean venison; one and one-fourth gallons of cold water; two onions, sliced; one full cup of rice; pepper and salt.

Cut the venison into small slices and put them into the kettle with the water and salt. Put in the onions one hour before the soup is cooked, and the rice thirty minutes later. Fresh or canned tomatoes may be added to great advantage, and frequent stirring is necessary to prevent scorching or sticking to the bottom of the kettle.

FISH.

Fresh fish are best as soon as taken from the water.

They should not be soaked unless they have been frozen or have inhabited muddy streams.

Boiled Fish: A fish, or part of a fish, weighing less than three pounds (except rock-fish) is too small for boiling. The time required for boiling depends upon the size and variety. Salmon requires about 25 minutes, while six minutes per pound is sufficient for most kinds. As a rule, fish with white flesh require less time for boiling than fish with dark flesh. Care must be taken that the fish is neither underdone, boiled too much nor allowed to remain in the water after it is cooked. The fish is done when the meat separates easily from the back bone. Place the fish into enough boiling water to cover it about an inch, with two tablespoonfuls of salt and four tablespoonfuls of vinegar to a piece of fish of about five pounds weight, and cause it to boil steadily until done.

Fried Fish: Large fish should be cut up before frying. Wipe the fish dry, rub it over with sifted flour, or sprinkle it with grated bread crumbs or rolled crackers. Put into a frying pan enough lard to well cover the fish. As soon as this is hot put in the fish, fry briskly until a clear golden brown appears. Then turn and fry the other side to the same color. Just as the fish is turning brown, sprinkle it lightly with pepper and salt.

Baked Fish: Baked fish should be sufficiently large to admit of being stuffed, and will require from thirty to fifty minutes to bake.

Prepare a stuffing of bread crumbs, with sufficient butter, lard or beef dripping to make the mixture moist, and season with pepper and salt; also, a little thyme or sage, if obtainable. Scorching is prevented by placing a well-greased paper over the fish.

Baked fish are excellent when eaten cold.

Fish Chowder: One-half pound of salt pork; four onions; six potatoes; three pounds of fish; one-half pound of hard-bread.

Cleanse and cut the pork into thin slices, also slice the onions. Put the pork and onions together into a pot and fry them brown; then season lightly with salt and plenty of pepper. Slice the potatoes and lay them in cold water until wanted. Wash the fish, cut it into small pieces and soak the hard-bread in water until tender. When the pork and onions have browned and been seasoned, add a layer of fish; on the fish a layer of potatoes; on the potatoes a layer of crackers, and repeat the process until the kettle is nearly full. Set it over a gentle fire, let it heat gradually, and simmer until done.

Fish Sauce: One pint of boiling water; two tablespoonfuls of butter; same amount of sifted flour; pepper and salt. Mix the butter and flour into a smooth paste, in a saucepan on the fire, and pour over the boiling water, stirring it in well. The addition of a little vinegar will impart an acid taste.

MEAT.

Good fresh beef presents the following characteristics: The lean, when freshly cut, is of a bright red color, easily compressed and elastic, the grain fine and interspersed with fat, of a yellowish white color. The suet should be firm and perfectly white. In good mutton the fat is white also.

All frozen meats, game and fish should be put into cold water to thaw before they are cooked. Meat should not be placed in contact with ice, nor wrapped in anything that may impart a flavor. It becomes more tender and digestive by keeping it a while.

Baked Beef: Time, from fifteen to twenty minutes to the pound, depending on the oven, the quality of the meat, size and shape of the joint and the time it has been killed; freshly-killed meat requires a longer time to cook.

Cleanse the meat; place it in the pan with the fat side up; put the pan into a hot oven, and when the heat has started

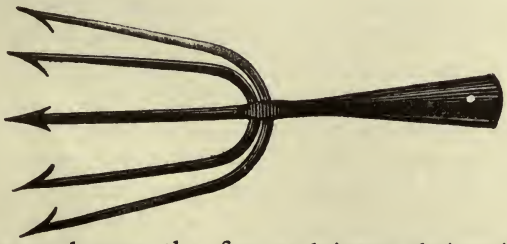
enough of the oil of the fat, commence to baste, which should be performed quickly and frequently, closing the oven door as soon as basting is done. When nearly done, sprinkle with salt and pepper.

If the beef is not sufficiently fat and juicy to furnish materials for basting, a tablespoonful or more of gravy or beef dripping should be put into the pan ; the practice of putting water into the pan to baste with is improper.

Broiled Beefsteak, Venison and Porksteak : A steak should not be less than three-quarters of an inch nor more than an inch and a-quarter thick. If beating is necessary, beat on both sides, but not enough to tear the beef and allow the juices to escape.

Prepare a bed of live coals (wood coals are the best) ; wipe the gridiron clean and put it over the bed of coals ; as soon as heated, put the steak on it and broil ; turn once or twice. If the fire smokes or blazes from the dripping fat, withdraw the gridiron for a moment. It should cook in fifteen minutes. After it is dished, season with pepper and salt.

The frying-pan serves splendidly as a broiler. The Indians use their fish-spears (something like shown in the drawing) for gridirons. They also frequently plant them



in the ground, near the fire, and insert their spits in the hollow handles.

Boiled Beef or Venison : Time, fifteen minutes to the pound, or longer, depending upon the shape and quality of the piece.

Cleanse the meat. Put it into a kettle of boiling water, rather more than enough to cover it. Cover and bring the kettle to a boil quickly, and let it boil for ten or fifteen minutes ; then let it simmer until the meat is cooked. Remove the scum as it rises. While boiling, turn the beef several times. If the water needs replenishing, use boiling water. A short time before the meat is done, put into the kettle one teaspoonful of salt for every five pounds of meat.

Put carrots and turnips (quartered) in the kettle, one and a half hours and potatoes twenty or thirty minutes, before the meat is cooked.

Fresh Beef, Elk or Deer Stew: Time, from two to three hours.

Cut ten pounds of meat into small strips. Put into a large mess-pan with four tablespoonfuls of salt, half as much sugar, a little pepper and about three pounds of potatoes and onions, or any other vegetables procurable. Keep on the fire and stir until a thick gravy is formed, adding a little flour and about three and one-half gallons of water. Let it simmer until the meat is tender.

Venison requires about 2¼ hours; beef, about 2¾ hours; and elk, about 3 hours.

Beef, Pork, Elk or Venison Pie : Fresh meat, potatoes, onions, tomatoes, pieces of butter or meat dripping the size of a hazel nut ; pepper and salt on every layer.

Cut the meat into two-inch pieces, removing the bone and any superabundance of fat. Cut the potatoes into slices a quarter of an inch thick, rinse in cold water and parboil them. Chop the onions fine. Slice the tomatoes. Roll the pieces of butter in sifted flour. Put the pieces of meat and bone into a kettle of cold water, just enough to cover the meat. Cover closely; remove the scum as it rises. Let it simmer steadily until half done. Remove it from the fire. Take up the meat and strain the gravy;

keep both warm. Line a mess-pan with a paste, first greasing the sides and bottom. Put in a layer of the semi-stewed meat, on the meat a layer of chopped onion, on the onion a layer of sliced tomato, on the tomato a half dozen or more pieces of floured butter, on these a layer of potato, on the potato a layer of meat, and so on in successive layers.

Pour over the strained gravy, put on the top crust, place in the oven and bake from one to one and one-half hours with a moderate heat.

Fried Liver: Liver to be good should be fresh; uniform in appearance on the surface; firm; of a bright red color when cut, and free from nodules. It must be thoroughly done to be palatable.

Cut the liver into slices a quarter of an inch thick, and soak it one hour in cold, salt water; rinse well with warm water, and dip each slice into flour seasoned with pepper and salt; put into a frying pan enough meat dripping, or bacon fat, to just cover the bottom of the pan when melted; while this is hot, put in the liver and fry a deep brown; turn and fry the other side the same color; then dish, pouring the grease remaining in the pan over the liver.

Beef, Elk or Venison Hash: The meats may be used singly or together. Four pounds of meat (without bone); two onions; two pounds of boiled potato; the meat cut into half-inch pieces; the onion parboiled and minced; the potato chopped into very small pieces. Mix all together and season with pepper and salt. Put the mixture into a kettle; stir into it about a quart of gravy, meat dripping, or water. Stir well together and cover; let it simmer for thirty minutes, or until the meat is quite tender, frequently stirring it. When the hash is done pour it into a dish over toasted or fried hard-bread.

Baked Pork and Beans: Time, from six to eight hours.

Two quarts of beans; three pounds of salt pork; one teaspoonful of bicarbonate of soda.

Prepare the beans and soak them over night in cold water; soft water is preferable. Parboil the pork and cut it into thin slices. Drain the soaked beans; put them into a kettle with enough fresh cold water to cover them; put in the bicarbonate of soda. Cover; boil for fifteen or twenty minutes; remove the scum as it rises; pour off the water; replace with boiling water; cover; boil steadily until tender; drain and season with pepper. Put one-half of the beans in a deep mess-pan; lay over them the sliced pork, then cover the pork with the other half of the beans. Pour over from a half-pint to a pint of boiling water; put the pan into the oven and bake with a uniform heat. Every hour add a little boiling water.

When cooked, the beans should be comparatively dry.

GAME.

The viscera should be taken out as soon as the game is killed. If the meat is not to be cooked at once hang it up in a cool dry place. Birds should be kept in their feathers and animals in their skins.

Bear and buffalo meats are better baked than cooked in any other way. Prepare, cook, and serve bear and buffalo meats like fresh pork or fresh beef.

At least twelve hours should elapse between the time of killing and cooking birds; but they should be drawn as soon as possible. If the bird is young, the lower part of its legs are soft, and the lower mandible will not sustain its weight.

VEGETABLES.

If possible, summer vegetables should be cooked on the same day they are gathered.

Boiled Potatoes: Time, twenty to thirty minutes.

Wash the potatoes; cut off a piece of the skin at the eyed end; put them into a kettle of boiling salt water, enough to cover them; cover; boil steadily until a fork

will easily pierce the largest. If cooked too much they become watery. As a rule, the smaller the eye the better the potato.

Peeling them before boiling is wasteful, and should only be resorted to late in the spring, when the potatoes have commenced to sprout.

They should be of a uniform size, that they may be cooked in the same time. If they are of unequal size, cut the large ones.

Baked Potatoes: Time, thirty minutes.

Prepare the potatoes and cut off a piece of the skin at the eyed end, and put them into the oven without their touching one another. Turn them frequently and bake in a uniform heat.

They should be peeled if baked with meat; or, if boiled in their skins, they may be peeled and placed in the baking pan with the meat about half an hour before it is done. Potatoes roasted or baked in their skins, in hot ashes, are excellent.

Fried Potatoes: Prepare the potatoes and slice them into thin pieces. Put into a frying-pan fat or meat dripping to just cover the bottom of the pan when melted. When this becomes hot put in the potatoes and season with pepper and salt. Fry gently, stirring them frequently, and until they become light brown.

Fried Onions: Peel, slice and fry the onions brown in hot butter, beef dripping or lard; season with pepper and salt. Stir them constantly to avoid burning.

Boiled Onions: Peel the onions (as uniform in size as possible) and lay them in cold salt water for fifteen minutes; put them into a kettle of boiling salt water; cover and boil gently; when cooked so that a straw can pierce them, drain and season with butter, pepper and salt. The strength of the onions may be reduced by boiling them in two or more waters.

Fried Parsnips: Boil the parsnips until tender; scrape off the skin and cut them lengthwise into slices a quarter of an inch thick; dip each slice into flour; put into a frying-pan enough lard or meat dripping to just cover the bottom of the pan when melted; when this becomes hot put in the parsnips, fry brown, turn and fry the other side the same color; when cooked, drain off the grease and season with pepper.

Stewed Parsnips: Boil and cut the parsnips into thin slices; put them into a kettle, with enough liquor from boiled fresh meat to about half cover them; season with pepper, salt and grated nutmeg. Cover and stew gently for fifteen minutes, stirring frequently.

Boiled Cabbage: If the cabbage is large, quarter it; if small, cut it into halves; remove the outer and all bad leaves; examine carefully for insects; wash, and lay it in cold water for half an hour.

Put it into a kettle of boiling salt water, and cover. When cooked (so that the stalk is tender), drain off the water and season with butter, pepper and salt.

The odor from boiling cabbage may be lessened by putting pieces of charcoal into the kettle.

Stewed Tomatoes: Peel (by scalding) and cut up the tomatoes, rejecting the unripe and hard portions; put them into a kettle, season with butter, pepper and salt, and, if the tomatoes are very acid, a little sugar. Cover, and stew gently for three-quarters of an hour, frequently stirring. The stew can be thickened with hard-bread crumbs. Minced onion cooked with the tomatoes improves the flavor of the stew. A mixture of equal quantities of tomatoes and young corn, cut from the cobb, may be cooked as above.

Fried Mushrooms: Select mushrooms of uniform size; peel them and cut off the lower part of the stem. Heat in a frying-pan enough butter to thinly cover the bottom;

put in the mushrooms and fry both sides to a golden brown.

Edible mushrooms are found in open sunny fields and elevated ground where the air is fresh. They spring up after low-lying fogs, heavy dews, or rains. They first appear very small and of a round form on a little stalk; the upper part and stalk being white. As the size increases, the under part gradually opens and assumes a delicate salmon color, which in the course of a day changes to a dark brown, The odor is agreeable, flesh solid and brittle and skin easily peeled. The spores are white and usually of an oval shape.

Boiled Rice: Time, thirty minutes.

One pound of rice; one gallon of boiling water; four teaspoonfuls of salt. Wash and drain the rice and place it into the kettle of boiling water, adding the salt. Cover and boil steadily for fifteen minutes, then thoroughly drain off the water. Place the rice (in the covered kettle) into a larger kettle of boiling water and steam it for ten minutes; and, finally, uncover the rice and steam a few minutes longer. Rice is frequently spoiled in boiling, by being reduced to a watery mass.

Rice Pudding: One quart of clean rice; six quarts of sweet milk (or an equivalent of condensed milk); one pound sugar; two teaspoonfuls salt; enough grated nutmeg and ground cinnamon to flavor.

Cover the rice with a portion of the milk and let it soak two hours; then add the remainder of the milk, and stir into this the sugar, salt, and spices.

Put into a well-greased dish-pan and bake two and a half hours in a slow oven. Serve either hot or cold.

Frequently, owing to a scarcity of water and forage, the camp will be made near a dwelling house or ranch, when

advantage may be taken of stoves, fireplaces and all conveniences for cooking.

If it is suspected that the enemy is in the neighborhood, prompt and proper attention must be given to the fortifications, and every precaution taken to make the place as strong as possible, in case of a sudden attack. Often, in the

absence of rock and timber, strong mud or clay fortifications may be quickly thrown up, so as to form a safe point of retreat in case of danger.

COFFEE.

Coffee should be quickly and evenly roasted to a light brown color. A few burned grains will impart a disagreeable flavor to it when made. Only a sufficiency for four or five days should be roasted at one time, and it should never be ground until required for use.

The following is an excellent method of making coffee both in barracks and in the field. It is the favorite receipt at Delmonico's :

Heat the grounds hot in a mess-pan, one tablespoonful to each person and one for the pot or kettle ; then pour on *boiling* water, one cupful for each spoonful of coffee. Cover tight and stand where it will keep hot, but *not boil*, for 15 or 20 minutes. Then strain into the cups. The coffee should

never be boiled. "Coffee boiled is coffee spoiled" should be remembered.

TEA.

The making of tea should be so timed that it may be served as soon as drawn, and the water used should be fresh from the well or spring. Bring the water to a boil as soon as possible; fill the *heated* pot or kettle with boiling water, put into it one teaspoonful of tea for every cup of tea that is to be drawn, and set the covered kettle on the stove or near the fire to draw, but not to boil. It should not draw long enough to dissolve the tannin, which gives the tea an astringent taste. The time for drawing varies with the different teas, and is about as follows: Green tea, five minutes; Oolong tea, eight minutes; English breakfast, fifteen minutes.

CHOCOLATE.

Six tablespoonfuls of scraped or grated chocolate to each pint of water; add as much milk (if procurable) as water, and sweeten to taste. Put on the water and bring it to a boil; rub the chocolate smooth in a little cold water, and stir into the boiling water. Boil twent minutes; add the milk and boil ten minutes more, stirring frequently. Sweeten upon the fire or in the cups.

Numerous fancy and palatable dishes may be prepared, from the simple articles of the *army ration*, by the careful and skillful cook.

CHAPTER XIII.

LIVING OFF THE COUNTRY.

It is frequently the case that supplies are taken by the enemy, destroyed by fire, lost in transportation or while crossing rivers and streams; and under such possible contingencies, with a view to securing food, it might be well to understand the habits of the birds and animals found in the country, about the line of march, and the properties of its various wild productions. Many varieties of wild berries and innumerable roots (such as *camas*, resembling the sweet potato in taste and nutritive properties) are found in nearly all localities and constitute excellent articles of food. Even the most barren trails will yield abundantly when properly laid under contribution.

Tobacco may be replaced by either the *sumach leaf* or *red-willow* (shongsasha) *bark*, found along the mountain streams. The bark is roasted and pulverized, when it is found to possess most of the narcotic properties of tobacco.

Equal portions of tobacco and *yellow willow bark*, when mixed, will afford a double quantity of excellent smoking material.

Coffee may be very satisfactorily replaced by a decoction of *horse mint;* and a little *gun powder*, sprinkled on the slightly burnt meat, will impart the taste of a rich salt and pepper seasoning.

Whenever it is prudent, hunting parties, consisting of three or four men, should be sent out daily. They will not

only supply the camp with a variety of game, but will at the same time perform the valuable duties of scouts and flankers. In order that they may be successful, they must carefully note the habits of the different game and the points to be observed in hunting it. I will here submit a few notes on the game most frequently met with in the Northwest.

Among the animals of the genus *cervus*, the *elks* are the largest and most sought after by the Indians and hunters.

Their flesh resembles beef, though less highly flavored, and the skin is variously used in articles of clothing, etc. The average weight is about 500 pounds. Their habits vary with the locality and season of the year. They usually travel at night and in single file, leaving a well-defined trail, and seldom remain longer than one day in any particular neighborhood.

Unless shot in the proper place (through the shoulder blades a few inches beneath the withers), they will continue to run for many miles, and their speed in flight is so great (unless forced to break the trot) that they mock the chase. When passing through timber the antlers are thrown back on each side of the body. If permitted to trot, they will advance twenty miles or more without tiring or stopping. They possess the faculty of doubling and hiding with great facility, and their senses are so keen in apprehension, that great caution is necessary in order to approach them.

Elk or other fresh meat may be cured or '*jerked*' by cutting it into very thin strips and drying it in the sun; or, by placing the strips on a frame-work of poles and running a slow fire beneath it. Salt should not be used; it is only necessary to keep the meat dry to avoid putrifaction.

There are four species of deer; the common American, the red, the black-tailed and the long-tailed deer. Like those in the Eastern States, they are of a mild, innocent, timid aspect; beautifully formed, with slender and nervous

limbs; but, the flesh is more lean and less inviting, in consequence of their having less opportunity for browsing upon shrubbery of the saccharifeous kinds.

They generally use their noses in the direction of the wind, and their eyes in the opposite one, and can only be approached *across the wind.*

The proper time to stalk them is early in the morning or just before dark, when they are feeding and less on the alert. '*Salt licks*,' or saline incrustations, have great attractions for them, and they will frequently travel long distances at night in order to visit them. The slightest movement of an object will attract their attention, and they usually show alarm by throwing up the head and suddenly jerking the tail.

Should a fawn be discovered, it is a sure sign that there is a doe secreted within calling distance, and she may be captured if sufficient caution be exercised. The Indians produce a noise by means of the mouth, very much like the bleating of a young fawn, and thus call the doe within range.

Red deer are found in all latitudes. They are not migratory, but remain throughout the year near their chosen haunts, generally the cover of the thick clumps of willows, or cotton-woods. They are most abundant about the head-waters of the Salmon and Clearwater rivers. During the summer they live on the mountain grass, but descend into the warm valleys in winter, when they are easily taken. They have less vitality than the other large animals, but are seldom dropped unless the back be broken.

Black-tailed deer are slightly larger, but much darker than the red deer. The tail for about three inches is tipped with short, black hair. They are extremely fleet and use all four legs at once in making the spring. They are seldom seen away from the mountains, except in August and September, when they make excursions of many hundreds of miles. They seem to possess much curiosity: for a few moments they will bound off with great celerity, then stop and investigate the cause of alarm. This is the moment for the hunter to fire. They prefer the dense cover of pine or cedar thickets, and generally hide in cañons where they can observe all going on lower down, and get timely notice of anything approaching from above. They feed during the night and in the early morning, and are very similar to the elk in all their habits. They are very tenacious of life and will generally run off after being shot.

The long-tailed deer are found very high up in the Rocky Mountains, and are distinguished by their very long tails—their bodies are also much longer than those of the other species. They are exceedingly scarry and must be most

cautiously approached. Their flesh is very tender and of a most pleasant flavor. The sharpness of the hoof and the precision with which it is used render it a very dangerous weapon.

Antelopes are found on nearly all the elevated prairies, but they seldom go into the timbered sections. During the winter they penetrate the mountain valleys wherever they can find good shelter and pasturage.

The prong-horn (horns curvated at the ends) is the species found in Western North America. They are generally red and average about fifty pounds when dressed. The meat is sweeter and more tender than that of deer.

Curiosity is their besetting fault. A handkerchief fastened to the ram-rod, planted in the ground, will so attract them that they will approach it until within easy range of the hunter secreted in the grass or hills near by.

They have exceedingly acute senses of hearing and vision, but seldom associate sound and danger. By firing so that the bullet will knock up the earth in front of them, they will generally retreat from that point toward the firer.

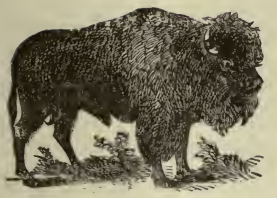
They possess the faculty of finding water in desert localities.

In September and October they move in large herds, following and imitating their leader in all his motions.

They possess great courage and vitality, and unless properly hit, will carry off several bullets.

Their tracks are much shorter than those of the deer, are sharp at the toes and broad and round at the heels.

The buffaloes, of the *bovine* genus, are the largest and most important, for food and covering, of any of the animals of the North American prairies and mountains. They



are generally about the size of our domestic neat cattle, with a long, shaggy, woolly hair covering their head, neck and shoulders, which gives them the formidable appearance of a lion, when at a distance. They are cloven-footed, chew the cud, and select the same kind of food as our horned cattle. Their flesh is much superior to beef, in flavor, and is remarkably easy of digestion. When running, they lean alternately from one side to the other and carry their heads very low ; and although clumsy in appearance, they will run for a long time without slackening their speed, up and down very steep hills. Their legs and feet are small and trim, the forelegs being covered with the long hair of the shoulders as low down as the knee.

When feeding they scatter over a large space, but when fleeing from danger, they collect into herds, composed promiscuously of bulls and cows; and having once laid their course are not easily diverted from it. They possess the faculty of selecting the best route over the roughest country.

The limits of their range are becoming more and more circumscribed; and, if they continue to diminish as heretofore, they will soon become extinct. They are frequently taken by still-hunting, but oftener by pursuing them on horseback, when the former is impracticable.

Their power of scent is great, and they perceive the hunter at a great distance, when he is on the windward side.

They do not become alarmed at the report of the rifle; and, so long as the hunter is not seen or scented, they will stand and gaze about while those near by are being shot down.

To produce the best effect, the shot should be delivered

about the center of the body and eight or nine inches behind the fore-shoulder.

The tongue, hump and marrow-bones are the most desirable parts of the buffalo. The tongue is best taken out by severing the skin between the prongs of the lower jaw-bone, and drawing it through the orifice. The hump is removed by skinning down on each side of the shoulders and cutting loose the meat.

The movements of the immense herds regulate the location of many Plain's Indians; and constituting, as they do, their commissariat, frequently govern their ability for war.

The Indians and trappers of the Northwest prepare a food known as '*pemmican*' as follows: The buffalo flesh is cut into convenient flat steaks or slices, and hung in the sun or over a slow fire until dry. The dried meat is ground between two rocks until very fine, and is then pressed into a bag made of hide. This is securely stitched and the pemmican allowed to cool and harden. When required for use, it is cut from the hard mass and either eaten cold, or is mixed with flour forming a porridge called '*robiboo.*'

A smaller species than the Plains buffalo is said to inhabit the Rocky Mountains in various localities. I am inclined to think it an error, however, and that the *mountain buffaloes* are really visitors from the Plains, appearing smaller because generally seen at a great distance, occupying as they do the very precipitous and inaccessible sides of the mountains.

Antelopes are always found in the vicinity of a buffalo herd.

There are four varieties of bears—the grizzly, cinnamon, brown and black.

All the bear family, in their habits, are quite alike—hybernating in winter, possessing little or no courage unless cornered, having a keen sense of smell and at times exhibiting great intelligence.

So far as physical strength goes, the *grizzly* has no equal, and frequently weighs six or eight hundred pounds. He depends more upon his strength than speed for taking his prey, and generally lurks in willows or thickets, so as to suddenly seize upon any animal passing near him. He apparently eats very little (mostly ants, insects, roots and wild fruits), but keeps quite fat. The shades of color vary from light gray to dark brown; and the hair is finer, longer and more abundant than that of any other species.

The *cinnamon bear* resembles the grizzly in all respects except size, but is not a variety of the latter as is frequently supposed.

The *brown bear* is more solitary in his habits, less ferocious, and is but little esteemed either for food or for his skin.

The *black bear* possesses a very valuable pure black, well-coated skin. He lives more upon vegetable food and furnishes from 200 to 300 pounds of very excellent meat. If cornered, he will make a good fight; but if pursued, he will run with great speed and will head for the nearest tree, rocks, or jungle. It is seldom, indeed, that he does not get the wind of the hunter in time to make off.

The cougar (*California lion*) is very shy and only prowls at night. When hungry he will approach the camp, and is best secured by means of the spring gun. When pursued, he soon becomes tired and either ascends a leaning tree or takes refuge in the branches of fallen trees; and, unless shot through the brain, will endanger the life of the approaching hunter.

Brown wolverines are inhabitants of the Salmon River mountains and differ in several particulars from those of other localities. They are, when full grown, about two feet in length, with comparatively small bodies. They have short legs and necks and very small eyes and ears. They live in

caves and under rocks, and are seldom bagged, being extremely far-scented and always remaining near their hiding places. They are easily captured, however, when overtaken, and furnish good meat and a skin covered with fine fur more than an inch long.

Mountain sheep, very much resembling the chamois of Europe in their habits, are found on the most inaccessible peaks and plateaux of the Rocky Mountains. They climb over steep and rugged cliffs and skim the almost vertical slopes and fearful precipices of smooth granite with wonderful daring and swiftness. Frequently they leap from great heights, landing on their horns, probably in consequence of their great weight.

Their feet are very soft and spongy and enable them to cling to projections so as to ease up during a descent.

Although gregarious, they seldom exceed six or eight in one flock. They seem to be a combination of animals—the body is that of the deer, but much larger; while the head is that of the domestic sheep, except the horns, which vary from fifteen to twenty inches in circumference at their juncture with the head.

The least unusual noise or appearance fills them with dread alarm, and they will most curiously disappear without leaving any *sign* or passing again in view. The Sheep-Eater Indians, captured by my command in 1879, near the Middle Fork of the Salmon River, in Idaho, are so called from the fact that they subsist principally upon the flesh of *mountain sheep*, and make their articles of clothing of their skins, which are covered with a peculiar hair resembling wool, which serves to keep the body very warm in the winter. These Indians would usually capture them by surrounding the mountain on which they were grazing or reposing and cautiously closing in upon them. Their flesh is fat and delicious, when in best season, during the months of September and October.

Their heads and horns frequently weigh as much as seventy pounds.

The Indians say that mountain sheep and deer (especially black tailed deer) are never found together, and that whenever the deer suddenly come down to the river bottoms it is a sure sign that the sheep are on the mountains, and they hunt them accordingly.

There are five different species of wolves in the Western mountains.

The *common gray wolf* has the appearance and habits of those found in the East.

The *blue wolf* is rarely seen, is very sneaky and roguish in his disposition, and usually prowls at night. He is very angular, has long hair, freely interspersed with white, and always has the appearance of being nearly starved. He is the most cowardly of all the species.

The *white wolf* resembles the blue wolf in everything except color. They are very seldom seen.

Many of the mountain Indians regard the capture of a white wolf as the grandest accomplishment of the chase, and hold their skins in very high estimation.

The *black wolf* is larger than any of the other species and

more noble in his appearance. He is the strongest of the wolf kind, is very daring and will not run unless the odds are very much against him. He resembles the fox very much in general appearance, but is several times larger.

The *coyote* is scarcely larger than the fox and is very uniform in size, color and habits. Like the other species, he is always prowling and cowardly. His hair is of a dull reddish gray, very long and blended with brown fur at the roots. He exhibits a great deal of curiosity; and, when it is safe to do so, will follow parties or caravans, like a dog.

They frequently congregate about the camp at night and howl fearfully, and will often cause annoyance by skulking into camp and seizing articles of supplies. They are usually found where all other game is scarce, and are only good for food in the total absence of all other varieties.

The *fox* is found in three different kinds: the red, gray and silver. They do not differ from those found east of the mountains. The skin of the silver fox ranks high among the furs of commerce.

Martins are found in the woody mountains of the Salmon, but are more abundant and of better quality farther north.

Of the feline kind, there are the panther, the wild cat and the lynx.

The *panther* is much like the cougar, but smaller. He is an excellent climber, very ferocious, but never makes fight with man.

The *wild cat* is widely diffused throughout the mountains, and a species known as the '*long tail*' are much larger than the Eastern specimens. They are of a dull reddish color, run rapidly and possess much endurance. They live in rocks, hollow trees and dense thickets, and feed principally upon birds and prairie dogs.

Lynx are very abundant in the lower wooded mountains, but seldom come under observation.

The *beaver* (castor Americanus), a variety of the Euro-

pean species, is abundantly found throughout the mountain streams; and, besides its valuable fur, it furnishes the hunter an excellent flesh for food. I never saw any evidence of the truth of the assertion that while the flesh of the hind parts is like fish in smell and taste, its fore parts are of the quality of land animals.

They are of very social habits, and may be frequently taken when about their villages; but they are generally on the alert and require the hunter to approach with great caution.

The *land otter* is also found along the mountain streams and furnishes a very good skin and food. It varies in color from a light to a dark brown; and, in formation, is adapted to both land and water. It is generally taken while sliding down steep snow drifts or grassy banks, an amusement for which it manifests a great love.

The *badger*, *marmot*, *mink* and *musk-rat* are found in nearly every Western locality and do not differ materially from those on the eastern part of the continent.

The *woodchuck* (Arctomys monax) is the most numerous of all burrowing species, and in the absence of other food, makes a very tempting dish.

The *prairie-dog* (Arctomys, ludovicianus) is a smaller species of marmot found on all the prairies west of the Mississippi. They are cautious, provident and phlegmatic—are very fond of society and seem to have regular hours for visiting.

They burrow in dry and arid ground, digging their holes in close vicinity, and live on grass, roots and other vegetable substances

In their villages, which often extend over miles, they live like law-abiding citizens.

Their sentinels are regularly posted and are quick to give the alarm upon the approach of any unknown or dangerous object.

Being susceptible of atmospheric influences, they will serve as excellent barometers. Just before a storm they are very demonstrative, and rush up to one another and from burrow to burrow as though they were exchanging thoughts.

Their flesh is very good as food, and nearly all the carnivora in their neighborhoods prey upon them. The rattlesnake and burrowing owl are their frequent, but I believe unwelcome, guests.

They are so called, not from their appearance, but from their barking, which is like that of a small dog.

There are two varieties of squirrels found west of the Rocky Mountains that I have never heard described. One is a handsome gray, about one-third larger than those found in the East; while the other is a beautiful variety of striped squirrel, about one-half as large.

The inoffensive hare and rabbit are found in three varieties.

The *common hare* has the same characteristics as in other regions.

The *jack rabbit* strictly belongs to the Plains, but is always

found in the sage-brush bottoms throughout the mountains. It runs with great ease and swiftness, and its motions are an alternate running and leaping at almost incredible distances. Its flesh, when used for food, is rather tender and of a pleasant flavor.

The *rock rabbit* is very small, being only five or six inches long and has pointed ears. They live in the rocks and seldom go very far from their holes. The Indians consider their flesh a great luxury.

The largest part of the feathered race of the West are migratory. Among these are several species of grouse (including the *ruffed grouse*, improperly called partridge and pheasant), several varieties of eagles and hawks and the common Eastern quail.

The *gray* or *sage grouse*, the *pinnated* or *prairie grouse*, the *willow* or *sharp-tailed grouse* and the *mountain* or *blue grouse* are all more or less abundant in the mountains, although they properly belong in lower altitudes.

Near the head-waters of the Salmon, I have noticed a species of quail, much smaller than the *ortyx virginianus*, lighter colored and better spotted, and having a beautifully striped neck. Its habits are gregarious and it is remarkably tame.

As the Autumn advances, the variety and number of geese, cranes, swans and ducks multiply.

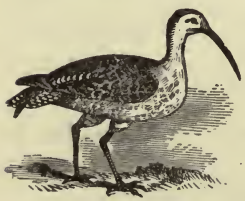
Nearly all the year round, a peculiar variety of wild goose, possessing many of the features and characteristics of the sand-hill crane, is found about the

most elevated mountain lakes. The Indians associate their presence with deer, and will travel many miles when hunting deer in order to take in such lakes as are known to be patronized by these birds.

The *loon* (colymbus glacialis), or *northern diver*, is very plentiful about the Columbia river and its tributaries, and is occasionally found at the extreme head-waters near the summit of the Rockies.

It is seldom seen, but frequently utters its horrible cries, which once heard are never forgotten. Many of the mountain Indians regard its cry as an indication of the presence of the evil spirit, and are exceedingly restless while in its vicinity.

Spring, with its rising vegetation, brings its many genera and still more numerous species of feathered tribes, which remain for different periods of time, so that the skillful huntsman may always be repaid with a variety of ornithological treasures.



The *curlew* (scolopax borealis) is found very abundant and in a wild state on the high grounds (probably nesting), many hundreds of miles from the sea-shore, where it belongs. It requires very hard hitting to kill it, and the hunter must possess skill and patience. Its plaintive cry is well expressed in its name.

When one is wounded, it will attract all of its companions, within sight or hearing, to the spot.

Vast numbers of locusts, grasshoppers and crickets are continually passing over the mountains; and, in the absence of other food, are greedily eaten by the savages.

Crickets, something on the order of genus *gryllus*, but about one-half size larger, make a favorite dish on occasions of ceremony. The Indians lay in large stores, merely smoke-dried, which they afterward serve up with roots and underground productions.

It will be well to observe, at all times while hunting, the following suggestions:

1*st. Advance across or against the wind.*

2*d. Keep out of sight while approaching the game that has been located.*

3*d. Cautiously approach the top of every ridge, so as to be able to see any game, before exposing the body to view.*

4*th. Never fire when seized with the 'buck fever,' but wait until perfectly cool; and then take a rest for the rifle, if possible.*

5*th. Underestimate rather than overestimate the distance of the game, and thus secure the advantage of ricochet shots.*

6*th. Reload immediately after firing; and should the wounded game run off, hunt in some other direction than that taken by it.*

7*th. Never hunt alone, unless within sight or hearing of the camp.*

8*th. While preparing the game, should there be no tree or brush to which to make the horse fast, either hobble him or tie him to the animal's horns or body.*

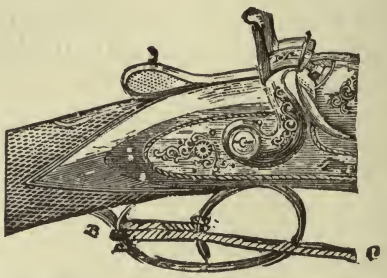
9*th. When game falls in deep water, take a long, light string and tie a stick on the end of it; throw the stick beyond the floating game and gradually draw it in.*

The Remington combination (40–50) breech-loading rifle and shot-gun is excellent for hunting purposes, and a single one judiciously handled will furnish a large command a good daily allowance of game in great variety. A few shot-guns should accompany every command in the field.

The hunters should be selected with a view to the particular game sought after, as they seldom have the same success with all game. I seldom miss an elk, deer, or bear;

but could never hit a coyote. As a rule, good target shots are poor hunters.

When game is abundant and its habits are well understood, it may be readily secured without any great exertion by means of *spring guns.*



The drawings show two simple modes of setting the guns. When the game passes along the trail in front of the muzzle and comes in contact with the cord (*c*), acting on the trigger, the gun is discharged. The gun and cord are so placed that the load may be discharged into the most vital parts of the game.

When setting a gun trap, warn the camp, make sure the gun is cocked the last thing, and never cross in front of it.

A *bow and arrow trap* may be successfully used when it is desirable to save ammunition or avoid the noise of the discharge. A large and strong bow, charged with a number of arrows, is set with a line stretched across the trail of the animals, so that a set of trigger sticks may be acted upon when the game comes in contact with the line.

Nearly all the mountain streams contain an abundance of excellent fish ; among others, many varieties of trout and salmon.

A magnificent and interesting species, known as the *red fish*, inhabit the waters of the Payette and Wallowa Lakes.

The salmon is by far the most numerous and valuable fish found west of the mountains, and is of excellent flavor. There are many different species, but all are endowed with great muscular power, which enables them to press their way upward beyond falls and rapids into the small branches of the rivers, near their very sources. They are found in the head-waters of the Salmon as late as October and November, when they perish. The Indians boil their salmon in birch bark, by the aid of hot stones, when they have no kettles.

The rudest substitutes for *braided silk lines* and *split bamboo* or *lance-wood rods* will serve to capture the handsomest specimens of the mountain beauties.

Any anomalous-looking contrivance of feathers or colored fur, resembling flies of the rudest type, are often as effective as the most carefully prepared baits.

When fishing unknown waters, it is generally well to use such baits as may be secured about their immediate shores. Grasshoppers, locusts, beetles, mantis, grubs, and many specimens of larvæ found in decayed logs may be readily secured.

The drawing shows the manner of properly baiting, so as

to cause the exposed parts of the hook to appear as a part of the fly or bait.

Salmon roe or hard-bread dust cast into the water and permitted to sink gradually will attract the fish in great numbers.

A good substitute for a fish hook may be made by scraping a strip of whale bone, or tough wood, round and fine, and binding on another finely pointed piece, at an acute angle (*a*); or, an ordinary sail needle may be made to serve as a hook by making it fast to the line as shown (*b*). Even a horse-shoe nail may be converted into a hook.

Very good lines may be made from most any of the vegetable fibres obtained by soaking the stems of plants and the inner barks of trees ; also, from the hair of animals, particularly that of horses.

To cook fish without cooking utensils :

Dig a hole in the ground sufficiently large to contain the fish ; build a fire in it and let it burn. Remove the coals, leaving the hot ashes at the bottom, and put a thick layer of green grass over them ; place the fish on top of this and cover with more grass ; then rake back the coals and loose earth and continue a small fire on top. At the end of 40 or 50 minutes the fish will be nicely cooked, retaining all the juice ; and the skin will peel off, leaving the flesh perfectly clean and free from ashes.

CHAPTER XIV.

INDIAN CHARACTER.

In studying the Indian's character, we will find much to incite admiration, while many of his traits and customs can only serve to shock and disgust. While he is of a much higher standard than those who live near him would have us believe, he nevertheless falls short of the popular Eastern idea of his goodness and greatness.

Two centuries ago, the number of Indians in the United States exceeded 2,000,000; to-day they fall short of 300,000, being distributed as follows:

In California, Oregon and Washington Territory	50,000
In Arizona and New Mexico	50,000
In Utah, Nevada and Colorado	35,000
In Idaho, Dakotah, Wyoming and Montana	70,000
In Indian Territory (partly civilized)	70,000
The numerous wandering tribes	25,000

The record of every tribe tells the same story—a constant and rapid decrease, the result of wars, intemperance and contagious diseases.

There are about 50 tribes in Oregon, Idaho and Washington Territory, all speaking a strange patois, known as 'Chinook Jargon,' the same word frequently appearing as a noun or verb, according to the context. Some of these tribes are at constant war with each other, and make frequent invasions for the purpose of stealing stock and taking prisoners, and it is seldom that they return from an unsuccessful foray.

The various tribes have different customs and propensities, each having its particular style of dress and dances,

and its own manner of constructing camps, lodges and fires.

The men of each tribe are divided into '*the old men who stay at home with the squaws*,' and '*the young men who go to war*.' The latter are known as *warriors* and *braves*. A brave becomes a warrior as soon as he has met the enemy and has taken a scalp, and until this is the case he cannot take a seat in council. The greater the number of scalps taken, the greater the honor due, and hence the great number of indiscriminate massacres.

All the tribes have their own traditions and fables, many of which resemble those of Æsop.

It is singular that the word "*Æsop*," in *Comanche*, means '*to lie*.'

According to the traditions of some tribes, their ancestors came from a distant country in the West, where they expect to go after death. The beliefs and traditions of many strongly resemble those of the old Testament, feasts being observed and sacrifices frequently made. In most of their traditions animals speak and act, and men are changed into animals and *vice versa*.

The following is the tradition of the Nez Percé Indians, as related by Chief Joseph, and may be regarded as a fair sample:

Thousands of years ago there existed an animal of immense size, way off to the southwest of the country now occupied by the Nez Percés. It was the largest of all the animal creation, and was known as the '*Ills-wau-tsih*.' This animal's greatest propensity was the devouring of every living thing he came across. His voraciousness was so great that lizards and reptiles of all kinds and sizes, bears, wolves, and animals of every description, at one gulp, would disappear in the depths of his capacious maw. At the same time existed the Coyote, or "Little Wolf," noted for his cunning, and recognized as the chief among and by the other animals, they looking upon him as destined, at some future time, to work out for them a great deliverance.

Little Wolf had heard of the 'Ills-wau-tsih' and his slaughter, and determined to put a stop to it. To this end he girded on his armor, which consisted of two ropes made of wild hemp, a quiver made of bear skin, some tinder, and knives of flint—all of which he concealed under his fore-leg, and, being fully equipped, he started out on his perilous mission.

After traveling for many days, and over a great stretch of country, Little Wolf descried the 'Ills-wau-tsih' in the distance, and immediately prepared for the conflict. Taking the two ropes, which were miles in length, he fastened them to a cord of sinew, which was about his body and made their other ends fast to two trees, a long distance from each other.

By this time the 'Ills-wau-tsih' was within hearing of Little Wolf, when he howls out, "Come on, old 'Ills-wau-tsih,' and prepare to die, for I am going to slay you!" The latter came, and the battle raged with considerable violence for some time. Little Wolf made some very good strokes now and then, but was finally compelled to abandon an active offensive fight and resort to cunning and operate on the defensive. The 'Ills-wau-tsih' had, however, swallowed Little Wolf, having him part way down when the ropes and sinew girth prevented his going down entirely. The old fellow stamped about and howled fearfully, and declared, "I will swallow Little Wolf." Taking a long breath, he made a huge effort—the girth was broken and down went poor Little Wolf.

After resting a short time, he made a tour of the belly of the monster, and found all kinds of animals and reptiles therein, which had been carrying on a kind of internal war among themselves. Feeling somewhat hungry, Little Wolf takes one of his knives and cuts a piece of fat from the heart of the beast, and warming it with ignited tinder, devours it; at the same time counseling obedience among the other inhabitants, and promising a speedy deliverance from

their prison. He then cooks a meal for his fellow prisoners and taking a piece of fat from the heart of the beast and rubbing their wounds and sores, says, "You are my subjects, and it is now time to get out of here. In taking the fat from around the heart, I have struck him a death blow." Proceeding with his work, he caused him to howl tremendously. He writhed and kicked and tried to throw up his 'supper,' but could not dislodge Little Wolf, who did not propose to leave until his mission was accomplished. The old fellow declared he would eject him, but, failing in the attempt, rolled over and 'gave up the ghost.' Little Wolf then walked out and took the meat from the bones and had a right hearty meal. The bones were scattered to the uttermost parts of the earth, and an allotment of land was made to each of the delivered ones, which they were to take as their country; while it was promised that a race of people would spring up from the bones of the beast in all respects like unto them.

"But," said the Fox, "you have reserved nothing for yourself." Little Wolf called for water, his paws yet dripping with the blood of the beast. Then dipping them in the water he scattered the blood and water all over the country occupied by the Nes Percés, saying, "From this shall spring a people to inhabit this land with me."

Little Wolf was then transformed into a chief and a tribe sprang up around him.

The Nez Percés claim that what they lack in stature they more than make up in cunning and intelligence, taking after their illustrious progenitor, Little Wolf. It seems remarkable that such an intelligent people should continue to nourish this tradition.

There is a *Medicine Man*, in each tribe, who conducts the exercises on every occasion of 'making medicine,' and frequently performs the duties of priest, surgeon and physician.

Most tribes recognize two Gods, a good one and a bad one, and it is a solemn occasion when they 'make medicine,' to determine which is with them at any particular time.

The surgery of the 'Medicine Men' is quite deficient. When the wound is external, they rely principally upon charms and incantations. When the sickness is internal, it is beyond their comprehension, and the remedy is the '*sweat bath*' or '*counter irritant.*' In the latter case, when

the pain is internal, the first act of the 'Medicine Man' is to apply a red hot iron to the back; and as soon as the pain is transferred to the latter wound, he proceeds to treat it. Sickness is frequently attributed to evil spirits, and horrible wounds are inflicted upon the sick in order to dislodge them.

They are possessed of almost innumerable superstitions.

They believe that all Indians, except those who are scalped, will go to the 'Happy Hunting Ground' after death, and thus it is that they will risk many lives to prevent the body of any one of their number from falling into the hands of an enemy.

They entertain similar ideas in connection with 'hanging,' and would rather suffer a death of torture than submit to it.

Upon reaching the 'Happy Hunting Ground,' they believe that they will need everything required in this life, and such articles as they cannot make themselves must be buried with them. Their favorite horses are killed at the graves, and every endeavor is made to give the dead a complete outfit in the 'Happy Hunting Ground.' Indians will go hungry and do without game rather than disturb a rifle placed on a grave near by.

The superstition that if killed in the dark, they will be blind in the next world, is very generally entertained, and thus it is that Indians will seldom or never make a night attack.

Upon going into camp, after taking scalps, they will invariably fire a few volleys over them, believing that such demonstration will frighten off the spirits of those scalped.

When they claim a lineal descent from bears, wolves, etc., they generally select such an animal as their totem, and never kill or eat it; but, on the contrary, regard it as their protector and address it in prayer.

When calamities are threatening, as an atonement to propitiate the great spirit, they will sacrifice their dogs or ponies and will even give away their children.

Indians have no family names. Generally, the warriors give themselves names expressive of some well known successes, or of the characteristics and appearances of certain animals. The others take names suggestive of certain

shortcomings or accomplishments, or those of white men with whom they come in contact. The women are usually named after their personal charms or defects;—all are prone to change their names frequently.

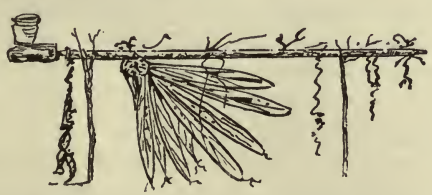
Cousins are generally called brothers and sisters, and aunts are called mothers.

The boy becomes a man at 15, and goes out in search of fame, perfectly satisfied with his condition, even when hungry and poorly clad. From childhood, he is taught to regard killing and scalping as the highest of virtues, and daily hears the warriors recite their deeds of pillage and murder as most precious things.

The clothing of the men usually consists of blankets, 'breech-clouts' and moccasins; while the women wear sleeveless and rudely made buckskin gowns. The men, and especially the warriors, often wear immense earrings. Their ideas of adornment are such as to render them, when in full dress and properly marked with paint and grease, hideous monstrosities rather than objects of attraction.

A blow is the greatest injury that can be inflicted upon an Indian, and only blood can make the ample reparation. His thirst for revenge is forever cherished, and he finds a special delight in the most hellish and ingenious tortures.

When a tribe wishes to go to war, messengers are sent to numerous other tribes asking for warriors for the expedi-



tion. The council pipe (sacred and public property) goes with the mission. The whole subject is thoroughly discussed in council, and such tribes as grant the request, accept the pipe and smoke.

When an accepting chief wishes to organize his war party, he mounts his horse, both in full war paint, raises a pole to which is attached a bunch of feathers and a small red blanket and rides about the village singing the war song. Those wishing to go, mount their ponies and follow the chief. This is continued several days, until there is a sufficiency of volunteers for the work.

During the absence of the war parties, the people at home become very anxious, and all the conversation is centered on the absent party and its probable time of return. When it is announced that the warriors are returning victorious, there is a great excitement throughout the village. The women chant songs of victory, while the old men narrate the deeds of their forefathers and themselves to excite the emulation of the young. The 'Medicine Men' gallop through the camp beating their drums and shouting encouragement, while the warriors painted black, with their horses in full war paint, perform the scalp dance.

If the expedition turns out to be a failure and some of the party are killed, the relatives of the killed cut off their own hair and the tails and manes of the favorite horses of the deceased, and cry without cessation for days, weeks, and even months. When any are slain in battle, it is the important duty of those left to retaliate by killing some of the slayer's tribe, regardless of age or sex.

Among themselves, murder is punished by a friend or relative of the deceased killing the murderer. They make no distinction between murder and justifiable homicide, and seldom make allowance for accidental killing. All other crimes have their prices fixed in ponies.

A murder is not considered satisfactory, by any means unless the perpetrator is enabled to sound the 'war-whoop' and 'scalp' his victim. The war-whoop—a shrill, piercing note on the highest key of the voice, with a rapid vibration, made by striking the hand or fingers

against the lips—is sounded just as the final dash is made or as the weapon is raised for the deed. Scalping is accomplished by grasping the hair above the top of the head, raising it with the skin to which it is attached, and quickly cutting the latter loose. Scalping *alone* is not fatal.

Many tribes seem to fear and respect those who commit suicide, and will leave their arms and clothing untouched.

The Indian's idea of excellence centers on war and the chase, and most of his time is devoted to breeding horses, making weapons, saddles, bridles, lariats and necessary things. They are in the saddle from infancy to old age, and excellency of equitation is the principal feature of their education. Many have no fixed homes, but are continually in the saddle, moving about with the game and the seasons.

Their wealth consists principally in ponies, and these constitute the medium of exchange in all transactions. The Indian and his pony live together, and there seems to be a mutual affection, although the master is unmercifully cruel. He will ride his horse up and down hill until he falls, then force him up and ride again, and when he falls to rise no more, will complacently sit upon him. He can ride *any* horse twice as far as a white man or Mexican, and can sit gracefully on horseback when he is so drunk that he cannot stand up.

An Indian always mounts on or dismounts from the *right* side. When mounted, his seat and carriage are particularly ungraceful, with his stirrups very short and his heels never ceasing to drum on his horse's ribs with a nervous but uniform motion. He scarcely moves his head or body and, when most watchful and inquisitive, appears utterly indifferent and phlegmatic.

He carries his rifle across the pommel, holds the reins in his left hand, while in the right he carries a short stick, to which is attached a thong of raw hide, a light blow of

which marks every step of his pony. With his horse at full speed, he will perform the most incredible feats of horsemanship.

The ponies enable the savages to transport their families and villages wherever their nomadic instincts may prompt, and the same food which subsists the countless herds of buffaloes answers well their purposes.

Indians are much more susceptible to cold than white men ; this, together with the fact that in winter the ponies are too weak and poor to carry them, renders them at such time noticeably helpless.

It is an interesting sight to observe an Indian family moving. While preparing for the move the men saunter about, apparently evincing no interest in the matter, and the overburdened women hasten to and fro, take down the lodge-poles, wrap the bundles, load the ponies, and finally take their places upon the most dilapidated and insignificant specimens. The small children are packed in sacks and hung upon the saddles. Two poles are attached to the shoulders of a pony, one end of each dragging upon the ground. Frequently the poles are grouped together

and dragged, and are so arranged as to transport a heterogeneous mass of plunder, the sick and helpless.

The number and utility of the Indian dogs are astonishing; as pack animals, they are called into frequent requisition. One will moodily jog along, carrying a frying-pan on one side and a howling child on the other, while another sulks along with her whining puppies and a quarter of deer on her back.

The Indian dog has erect, triangular-shaped ears, a sharp muzzle, coarse hair, a bushy tail and a wiry frame. He never looks you in the face, nor wags his tail in an honest manner, but sneaks away and eyes you askance. Being half wolf, he is an arrant robber and expert thief, endowed with a very keen nose and great endurance.

Time and space are not considered by the Indians, and wherever they pitch their lodges there is their home. In the arrangement of their villages, the lodge of the chief is placed in the center and those of the warriors around it, according to rank. The entrances to the lodges always face the rising sun. The number in a lodge varies from six to fifteen persons and half as many dogs. Two fighting men for each lodge or *teepee* is a fair average. The leading events and achievements of their lives are recorded on their lodges by a rude system of hieroglyphics.

Should the *bad God* visit them, in the form of the small-pox, cholera, etc., they will desert their village, and nothing can induce them to return to the place. The frame-work of the lodges, left standing for years after, will furnish the historical account of the unfortunate tribe that once camped there.

At home or abroad the domestic drudgery falls on the women, the men having their full share of labor in the chase and war.

The men are usually tall and well proportioned, while the women are of low stature and frequently bent with the enormous weight of their burdens.

While the warriors have boasting spirits with little or no moral restraint imposed upon them, and a fiendish thirst

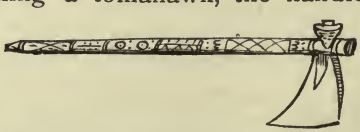
for blood; the women will frequently show devotion and tenderness, and discourage all cruel and warlike exploits. The sooner the boys throw off the restraint of their parents and openly rebel against the fathers, the better the indication that they will become great warriors.

In their villages they give much thought to amusement. Racing is a frequent pastime—whole tribes will wager against tribes, in the midst of great excitement. Story-telling is quite an art with them, the stories usually perpetuating some actual achievement and inspiring tribal pride. They frequently exaggerate and tell of impossible things with an air of earnest simplicity.

Gambling is their greatest vice. They are at it day and night, and soon become great cheats and shrewd players. The stakes are frequently high, even wives and children.

They manifest a strong desire for whisky and will barter anything in their possession for it.

With few exceptions, they are inveterate beggars. Their main endeavor is to get a great deal for little or next to nothing, and frequently they display much ingenuity in making a single article serve numerous ends. For instance, in making a tomahawk, the handle is formed of



young ash, the pith of which is easily burned out with a heated wire; which, after the necessary ornamentation, forms a most satisfactory pipe.

The food of Indians varies with the location, and well do they fulfill the declaration, "*Every creature of God is good, and nothing to be refused,*" there being but a few animals rejected in consequence of their superstition.

When food is plentiful they are choice in their selection; but when hungry, they will eat anything,—even snakes and carrion birds.

Dogs are not only articles of diet in emergencies, but on occasions of ceremony will form the favorite roasts of the savage gourmands.

Indians have no regular times for their meals, but eat whenever hungry, if they have food. The men, women and children seldom eat together. They never refuse to share their food with hungry visitors, and have contempt for anyone who eats alone or saves anything for the morrow.

Skewers of green sticks, serve for cooking purposes, while their roasting is done by embalming the meat in a coating of clay or mud.

Very few Indians are cannibals, and these eat their enemies only in order to justify their savage revenge.

Among the Indians, marriage is simple and has no responsibility except that inspired by terror. Ponies are given to the bride's father, who gives other presents in return. Captured squaws are always sold in marriage. The women are permitted to marry when 12 years of age or older—the men whenever they are able to support their wives.

There is no visible love-making, and *love in man* is frequently regarded as the greatest of weaknesses. The great desire of the faithful wife is to do all the work and have her husband do nothing.

Polygamy is common among them, and the women frequently elope. When this is the case, the injured husband is always paid a few ponies.

The favorite burying place of many Indians is in a tree. The selection of the tree, when a chief or noted warrior dies, is an occasion of great ceremony. The tree must be sound, in a well sheltered locality and out of the way of animals. If practicable, the body is left in a sitting posture, with everything likely to be needed in the 'Happy Hunting Ground' placed within easy reach. All scalps, taken by the dead man, are hung about the body.

Fierce yells and whoops, half nasal and guttural sounds, patting the feet, unseemly contortions of the body and exaggerated performances in imaginary struggles with the *bad God*, are the fitting ceremonies of the occasion.

After the burial, no farther attention is paid to the body or the grave.

In many tribes, upon the death of a mother, the infant is also interred, rather than suffer its incumbrance in the village. I have recently read the following account;—The mother suddenly died; whereupon, the infant child was placed in the arms of its dead mother, wrapped in a buffalo robe and placed in the tree selected for the grave. Its cries were heard for several days, then grew fainter and were finally hushed in the embrace of death, with the cold wind sounding its requiem and hungry wolves howling round about—a fitting dirge for so sad a fate.

A thorough understanding of Indian nature is essential in order to elicit from him any valuable information. Above all things he must not be hurried. When he becomes overburdened with a succession of ideas and his train of thought is disturbed, he will invariably lie in order to free himself of the confusion.

He must be permitted to minutely and tedious y tell his story—how many '*suns*' he traveled, how long he waited when the '*sun was so*'—whether he traveled this or that '*way-hut*' (trail), where he had his '*muck-a-muck*' (food), how he crossed the '*hyas-chuck*' (river), etc. When possible, let him trace the map on the ground. It is frequently necessary to put the questions in an indirect manner, in order to avoid his usual reply, '*wake cum-tux*' (don't know).

In dealing with Indians, it will be well to observe the following:—

Do not trouble about dignity; humor them as you would children; and be patient, neither displaying temper nor noticing insults.

Never promise nor threaten to do a thing without doing it.

They are safe neighbors while you assume a bold and self-confident bearing. Symptoms of timidity or indecision convert them into insidious and dangerous enemies.

Never appear to be afraid of anything; they soon notice fear or weakness, and as soon lose all respect. They resort to all kinds of tricks in order to test bravery.

Endeavor to accomplish every thing by presents and persuasion, never by force. For conciliatory purposes, make the presents to the head people and always take their wants into consideration.

Give them food whenever they desire it, if it can be spared.

An Indian is seldom satisfied with the bargain agreed upon, and it will be well to strike it low, with a view to raising afterward.

You can frequently trust to the honor of Indians, but seldom to their honesty.

Nothing pleases them more than to have those among them follow their customs.

CHAPTER XV

THE TRAIL, SIGNS AND SIGNALS.

THE difficult art of trailing or tracking is of great importance in Indian warfare.

While it is impossible for most white men to acquire this faculty, the constant exercise of the *bump of locality* through successive generations and the thorough investigation of every 'sign,' have rendered all savages sure guides over boundless prairies and through pathless forests.

A 'trail' is made up of various 'signs' or evidences that something has been present. All marks left on the ground, rocks, grass, trees or brush—the form, size, stride and directions of footprints and the firmness of impression, should be carefully noted. It should be made an invariable rule, when halting or camping, to make a reconnaissance of the ground in the neighborhood, with a view to ascertaining if any living thing is near or has lately passed.

The footprints of animals, their gait and direction, whether slowly walking (as in the act of feeding) or running (as when frightened), are all significant 'signs.'

Much valuable information may be obtained by carefully observing 'signs'; but to follow a trail successfully, one must not only possess a thorough understanding of all 'signs,' but also a knowledge of the character and habits of the thing trailed, the general features of the country round about, and the powers of the eye and ear must be cultivated to a great degree of acuteness.

The Indian well knows that the 'trail' is his principal weakness, and is never at a loss to resort to some ruse to complicate it, such as traveling over rocks and along the channels of streams, etc. He seldom thinks of danger ahead, but always keeps a proper rear guard in position, and strongly fortifies his camp toward the rear.

When closely pursued, a party of Indians will scatter and travel singly or in small detachments; and usually when the pursuers follow a single detachment, it will travel over the roughest and almost impracticable country, and make a detour of many miles.

When the 'trail' is leading toward some pass, *saddle* or low ridge or well defined landmark and suddenly becomes indistinct, it is generally safe not to expend time in hunting it; but to push rapidly on to the pass, etc., where the 'trail' will in all probability be found again. Before scattering, a point for concentrating is generally agreed upon.

When traveling over an unknown country, the Indian is guided by his nomadic instinct and the information received from those who have visited the section before. This fund of knowledge is very great. One of my Indian scouts (Chuck) in 1880, became quite noted for the accuracy with which he could designate suitable camps and various physical features of the country, relying *entirely* upon the information received from his father, who hunted in the same localities many years ago.

Traveling Indians usually set up mounds of stones to indicate the route and various other items of information, to those who may follow. In a timbered country, where the 'trail' is frequently covered with snow, the stones are placed in the forks and branches of the trees; or, the trees are *blazed* so that the notches face the traveler and at least two of them may be in sight at once.

The Indian seldom refers to the sun, moon or stars for his direction when traveling; but places his confidence in

something nearer at hand, which he believes to remain in the same place and which he thoroughly comprehends.

The trailer should not allow anything deviating from the common order of things to escape a rigid investigation. A close scrutiny will generally reveal both the plan and purpose of every active living creature. While keenly alive to all sounds, he should be able to unmistakably recognize the most ordinary, such as the croaking of frogs, the barking of coyotes, the hooting of owls, the cry of panthers or wolverines, the screaming of hawks and eagles the creaking of limbs, etc.

When trailing Indians, it is often important to know the especial customs of the various tribes. With this knowledge, the examination of the deserted camps, halting and resting places will invariably reveal the identity of the tribe once there; the fashion of fire-making, the style, cut and finish of the moccasin, the form of lodge, etc., are all unmistakable evidences.

This information is very useful when hostile and friendly Indians occupy the same country, and it is necessary to be able to distinguish between their trails.

Various circumstances connected with the 'trail' will afford important imformation.

Indians, when walking, point the toes inward, whether in moccasins or other gear. Many white men, in the Indian country, wear moccasins, but they leave a track with the toes turned outward. The various patterns of boots and shoes leave their distinctive tracks, and the particular way in which a boot or shoe has been pegged or repaired will enable an astute trailer to follow its print among hundreds of others. A careful notice of the form and depth of the impressions will generally indicate whether the person carried a burden or not; whether traveling at will or in haste; whether sober or intoxicated.

The age of the track may be determined in various ways.

If rain has fallen, it may be seen whether the tracks were made before, during or after it, by carefully noticing the grass, etc., trodden down, and observing whether or not sand or anything adheres to it. The morning or evening dew upon the 'trail' will also furnish a test of time.

The position of the grass, the sand, dust etc., drifted from or upon the track will serve to determine its age relative to the blowing of the wind, or its sudden change of direction.

Should there be several tracks, and the time when one was made be known, the ages of the others may be determined by noticing where they cross and observing which overlies the others.

When the 'trail' becomes lost in an unfavorable locality, it is best not to consume time in hunting it, but to proceed in the probable direction until a favorable ground is found, and then hunt it.

In a grassy locality, or on plains of coarse sand or shingle, the 'trail' is seldom visible at short distance, but may be noticed by looking out well ahead.

In a rocky country, or where the ground is very hard, when it is desirable to ascertain the track of a prowling enemy or animal, the Indians usually sprinkle sand (if obtainable) over the trails in suitable places. This is an old trick, for it is said in the Apocrypha that the prophet Daniel did this when he wished to ascertain who it was that nightly consumed the meat which was placed before the idol of Bel.

While encamped near the Payette river, in a point of rocks, it was observed that night-prowling animals visited my camp, much to the annoyance of the men, and at the expense of unguarded supplies. One of the Indians secured a quantity of sand from the river bottom, dried it, and judiciously placed it around the camp. The unmistakable tracks of a bear, two coyotes, a weasel and several skunks were observed the next morning.

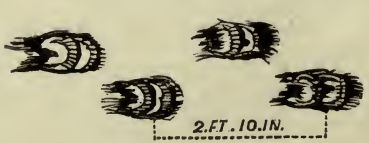
Frequently, when the ground is very hard or rocky, a close examination will reveal 'sign,' in the shape of stones or pebbles turned so as to lie with that side up, which has formerly rested on the ground. In such places, flakes of foam, fragments dropped from the animal's mouth, or minute blood specks (when trailing the wounded) are great helps. A bare-footed person, when passing over hard rocks, will leave a 'sign,' in the shape of fine dust caked by perspiration.

If there be marks of lodge poles upon an Indian trail, they may be regarded as a peaceful indication, and showing that the Indians passed with their families, lodge material and effects: if there be no such traces on the trail, it is an equally good sign that a *war* or *hunting* party passed, as they always leave such impedimenta in a place of safety.

It might be desirable to ascertain whether or not some members of an escaping party of Indians are women: this may be frequently determined by following the trail until a place is found where they have stopped to rest and smoke. The men sit cross-legged, and when sitting down cross their feet (locked closely together) and slowly lower their bodies to the sitting posture. The women sit with both feet and lower legs turned under, either to the right or left.

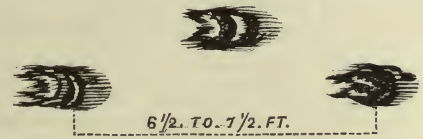
Horse or pony tracks may be followed over any 'trail'; but it is often difficult to follow them over rocks or very hard ground. When they pass over grass without trodding it down, the 'trail' is shown by the grass assuming a different shade of color from that about it.

The appearance of horse or pony tracks is very different at a *walk*, *trot* and *gallop*. The Indian pony is seldom or



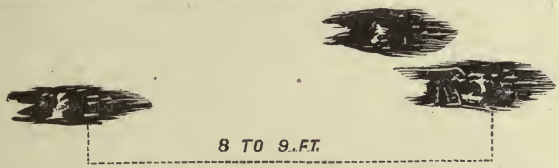
never shod, and the distance between his tracks (walking) is about 2 feet and 10 inches. The track may be readily distinguished from that of the American horse (larger and generally shod), or that of the mule (about the same size, but narrower and more angular).

When the pony trots, the tracks are from 6½ to 7½ feet



apart, the impressions less distinct and more irregular.

In the gallop, they are from 8 to 9 feet apart, and unless



the ground is very hard, there are no distinct impressions, but a mere disturbance of the earth.

A careful study of the impression left on the ground will serve to determine the pace at which the animal was moving. A walking or feeding horse should leave a well marked track, and a sudden scattering of earth, sand or gravel would indicate fright and an increased pace.

A knowledge of the movements of the pony, will frequently give valuable information regarding the rider—whether he is moving leisurely and is subject to surprise, or whether he has discovered his pursuers and is moving rapidly on in order to avoid a conflict.

To determine whether the horses have riders or are running loose, follow the trail until ordure is found: when scattered along the 'trail,' it is a sure sign that the animal was ridden and not permitted to stop. An equally good test, is to follow the 'trail' into a woods and observe

whether or not it lies under any branches of the trees too low to permit the easy passage of a mounted man beneath them.

An Indian rider always mounts on and dismounts from the right side, and by noticing the places where the mounts and dismounts are made, it may be ascertained whether the rider is an Indian or a white man.

The moisture where the earth is removed and the droppings along the 'trail' are good indications of the age of the tracks. Where water has been crossed, the ground will, for some distance beyond, be wet, and show where drops of water have fallen from the animal's body or legs or where it has been splashed while in the act of crossing.

Tracks on snow may be followed with great rapidity, but it is frequently difficult to distinguish between those left by different animals.

The mode of shoeing, any defects in the hoofs or shoes, and whether shod all around, on the fore feet only, or not at all, should be carefully noted, as such items are sure to furnish valuable information at some time or another.

Much may be learned of the Indian's condition by carefully observing the nature of his 'trail' and camping places. Should abandoned property or comparatively valueless articles be left along the 'trail,' and should there be indications of disorder generally, it is evident that he has experienced demoralization.

To show to what skill a trailer may attain by constant and careful practice, I will briefly mention a few of the exploits of my chief of Umatilla scouts—Shaplish.

Being once in rapid pursuit of a few Indians who had murdered the owner of a ranch, on the south fork of the Salmon, in Idaho, and having followed them about forty miles, apparently gaining all the while, Shaplish suddenly informed me, "*No catch him—hiyu run—no sun!*", meaning that we were discovered, and that the Indians were travel-

ing at night. He pointed out to me where they had gone under low branches of trees, which might have been readily avoided, and also where they had crossed rocks and ravines at bad places, when good crossings might have been selected very close by, if there had been sufficient light for the purpose of *picking the trail.*

Once, while hunting on the upper Clearwater river and ignorant of the location of the renegade Bannock Indians, Shaplish became very much exercised, fearing that a hostile war party might find his 'trail' and attack in the rear. After a brief consultation with the other members of his party, he dismounted, cut open his shoes; and, putting them on with the heels foremost, walked, thus equipped, in the rear of all, a distance of eight or ten miles. The *ruse* was a perfect success, for that very day a hunting party came close in rear ; but, seeing the track of what they supposed a single man going away from the party, they put their ponies about and at full speed started off, hoping to overtake him, preferring to make a sure success of capturing one rather than risk an attack upon the entire party.

Wishing to scout in two directions, I once sent out two detachments of ten men each.

They started from camp together, followed the same 'trail' for about 2½ miles, and then separated—one party going to the right, the other to the left. Having occasion to communicate with the commander of one detachment, I started Shaplish after him. It was plain sailing until he came to the diverging 'trails.' For a while he was puzzled to tell which detachment had gone to the right.

He soon selected the tracks on each 'trail' made by the men in advance (presumably those of the commanders); and, with a positive assurance, informed me that the route on the left had been taken by the party wanted.

When I asked his reason for so thinking, he showed me that the distance between the impressions on the left

'trail' was wide, and the deepest parts of the tracks were formed by the toes—all of which denoted the elasticity of youth, for which the man in question was much noted, in comparison with the commander of the other detachment.

Shaplish followed his selected 'trail' about ten miles, when his figuring proved correct.

Many other instances might be cited to show to what perfection the art of trailing may be carried.

By closely observing the movements and actions of animals a great deal of valuable information may be obtained. Should wild ducks be observed to *swim down stream* toward you, it is a sure sign that some form of man is approaching and has already been observed by the ducks.

If there be a mule with the party, it will be well worth the while to carefully watch his actions. If he stubbornly seeks a certain direction, with his head high and ears thrown forward, and seems much engaged, something is surely approaching ; it may only be a bear or some smaller animal, but it will be well to be on the alert until the cause of the trouble is known.

All the Indians understand the *sign language*, consisting of some words of French and Spanish extraction, a few English words, such as '*how*' (how do) and '*by*' (good-bye), and a complete pantomimic vocabulary.

It is a custom with most Indians to run their ponies when approaching either friends or enemies, and unless their status is known they should be halted in due time. This is done by raising the right hand back, to the rear, and waving it forward and backward.

'*Who are you?*' is signalled by waving the right hand to the right and left several times in quick succession; '*We are friends*,' by raising both hands and grasping the left with the right, as in shaking hands ; '*We are enemies*,' by closing the right hand and placing it against the forehead, or by waving a blanket (usually red) in the air. To say by signs '*that*

after a certain journey a good camp will be found, and that game may be found along the road,' first indicate the course of the sun, from its rising to the point at which it will appear on reaching the camp; then straddle one finger of the left hand with two fingers of the right, trotting them in imitation of the motions of pony and rider; then act as though halting, dismounting and firing; then remount and proceed on the way; finally stop, bow the head, rest it on the hand and close the eyes in imitation of sleep.

To intimate that '*such a one is dead,*' place one hand over the other and then quickly slip it beneath (gone under); that '*such ones are husband and wife,*' point to each and place the forefingers in contact throughout (meaning one); that '*such ones are brothers and sisters,*' point to each and place two fingers in the mouth (meaning nourished at the same breast); that '*such ones are good friends,*' point them out and fold the arms over the breast, etc.

The various tribes are indicated by making the representation of some totem peculiar to each.

The Comanches, or 'Snakes,' by a gliding motion, like a crawling snake.

The Crows, by imitating the flapping of wings

The Sioux, or 'Cut-throats,' by drawing the hand across the throat.

The Kiowas, or 'Prairie Men,' by imitating the drinking of water.

The Pawnees, or 'Wolves,' by placing the hands at the sides of the head, like the ears of a wolf.

The Arapahoes, or 'Smellers,' by laying hold of the nose.

The Utes, or 'Dwellers Among the Mountain Tops,' by pointing upward.

The Cheyennes, or 'Cut Arms,' by drawing the hand across the arm, etc.

The Indians have a system of signaling by means of smokes during the day, and fires at night. The color

(light or heavy), the volume (thin or dense), and the varying brilliancy of flame, are all significant signals. Every tribe jealously guards the secrets of its code of signals.

Smokes may be raised several hundred feet in a vertical column by making a fire without much blaze and piling on green boughs, grass and weeds. By confining the smoke and permitting it to escape at intervals, puffs may be sent up at will.

Owing to the very clear mountain air, the elevated 'buttes' and mountain ridges may be seen at a great distance, and may serve the purpose of signal stations.

The Indian alphabet is very similar to ours, being made up of long and short lines. By spreading a blanket over the column of smoke and quickly displacing it, the length or shortness of the columns, as well as their frequency, may be regulated.

This system of telegraphing, so successfully pursued by the Indians when separated and preparing for a flight or defense, might be used to good advantage by co-operating columns of troops, the commanding officers having previously fixed upon some simple system of signals, such as the combination of the numbers of smokes and the intervals (in time) between them.

CHAPTER XVI.

SKIRMISHING.

STRATEGY loses its advantages against an enemy who accepts few or none of the conventionalities of civilized warfare. The Indian is present one day and when next heard from is marauding in another state or territory; and oftener still, when supposed to be many miles distant, he is in ambush almost within range. He is like the flea, 'put your finger on him and he is not there.' Living off the country, without impediments of any description, and with no lines of retreat to cover, he is enabled to withhold himself from combat, unless he finds himself very superior in number and position.

That portion of our little army scattered over the vast Western Frontier is unable to strike such an enemy an offensive blow, and the prudence and efficiency of our commanding officers are frequently taxed to the extreme, when endeavoring to preserve the morale of the troops by acting even on the defensive.

While success is sure and good fortune is with the Indian, foremost in the attack is the post of fame; but when he fails in battle, or when fortune turns against him, rather than pay the forfeit of indiscretion he will abandon an attack or pursuit, and trust to the speed of his pony for escape; or, as a last resort, will abandon his horse and baggage and take to the rocks or timber on foot. Promptest action is then the only safeguard against his escape.

He exhibits marvelous abilities in horsemanship. When fighting upon an open prairie he will frequently cast himself on the opposite side of his pony, until a foot on the back and a face under the neck of the pony are all that can be seen, and will fire with great accuracy either above or under him while at full speed. Any obstacle to the pony is a serious obstacle to the warrior.

When advancing to the attack, he invariably annoys the flanks; and when on the most unfavorable ground will manage in some manner to perform a flank movement, seeming to thoroughly understand the moral effect consequent on having the flanks even slightly pressed.

He is very quick to secure the nearest commanding covered position, and in a lesser time will have made himself well acquainted with the ground—its contour, its relief, its peculiarities of slope and its successive rises. Having the heights, he well understands the necessity of taking position very near the *military crest;* and, by placing himself close to the ground, will, while unobserved, watch every movement of the enemy, and at the most opportune moment will open a deadly fire.

The drawing shows how the defender (who, while stand-

ing near the military crest, uncovers only his shoulders and

observes the whole body of the assailant as he climbs the ascent) will, on receding from the crest, place himself below the prolongation of the slope and lose sight of his climbing adversary. At the same time, he will receive the enemy's grazing fire as the latter ascends to the crest.

It is an excellent rule "to make haste slowly" in surprising or attacking Indians. A stampeded Indian cannot fight, but it is next to impossible to surprise or stampede him. When he makes a stand and has not the advantages of position and number, it is only in order that he may practice his favorite *ruse de guerre*,—displaying a feeble, venturesome force in the expectation of tempting pursuit; and, after having drawn the pursuers well away from the main force, surrounding and destroying them with overwhelming numbers, previously concealed in ambush.

Whenever he is surprised, his first impulse is to run, but he never fails to take his arms with him and make for the nearest cover,—timber, rocks or holes in the ground. When once repulsed, a quick and vigorous pursuit will lead to success.

When pursued, he evinces a reckless desire to save himself, without consideration of friends or property, and every instinct but that of fear seems lost. Frequently, when flight is impeded, old men are abandoned and the mothers will even abandon their infants.

While pursued, they adopt various measures to mislead those following, frequently breaking into as many detachments as there are lodges in the tribe, each party taking a different direction, having fixed upon the general direction and the place of reuniting.

At no time are Indians so helpless to make resistance as while moving their families and camps. At the first alarm, the squaws and old men will desert their charges and the whole movement terminate in a very disorderly stampede.

When following fleeing Indians, trusty scouts should re-

connoitre the trail some distance in advance, and carefully examine all rocks, woods and undulations of the ground. Every precaution should be taken to avoid being surprised by the Indian rearguard, usually concealed from view, but watching, with a keen vigilance, the most favorable opportunity to strike the pursuers a telling blow.

Above all things, a surprise is to be avoided; for experience shows that soldiers once surprised or stampeded by Indians are no longer suitable for work in the Indian country.

When the trail is very 'warm' and the country is unknown, the best and safest plan is to make *night marches* and *daybreak surprises.* The Indian is least prepared to resist an attack made during that uncertain period between darkness and daylight.

When endeavoring to make a surprise, and near the enemy, every effort must be made to avoid all noise. All communicating should be done by means of signals; and should a sentinel or picket be discovered, he must, if possible, be captured or shot.

If the surprise should prove a failure, a careful retreat must be made to the nearest cover; it is a fatal mistake to run away, as the Indians are thereby emboldened, and the running men are easily stampeded and caused to lose their presence of mind.

An untenable position is best abandoned during the night, as the Indian is, through superstition, very timid in darkness.

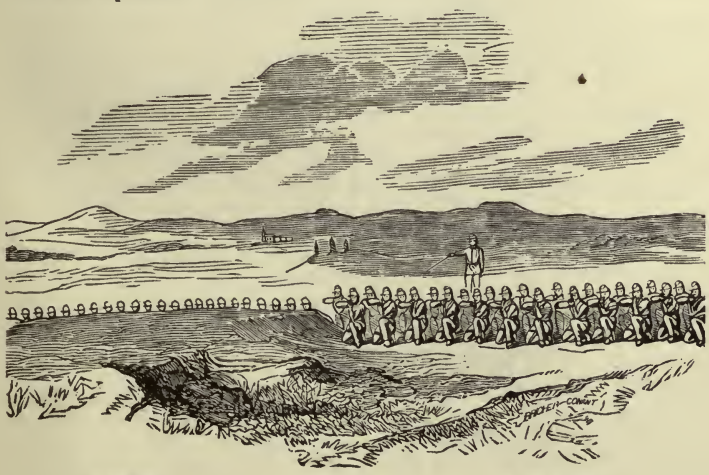
The commanding officer, in a hostile country, should always notice the *good positions*, and should he be surprised or repulsed when there are none in sight, he might frequently retreat to that last seen, with all well in hand.

In the absence of rocks, timber and high ground, even the slightest irregularities in the ground will often afford good cover. As a last resort, the mules and horses may

be thrown to the ground, with their legs tied together, or may be shot and used as a breastwork when there is but little time for preparation. An Indian dislikes, above all things, to attack a foe holding a defensive position of any kind, and is very cautious, and even cowardly, in his advances.

While of a very inferior order as regards discipline, and the courage that necessarily goes with it, he is at the same time very superior to all his foes in cunning and patience.

When the ground is undulating, rocky or woody, it is easy to avoid the enemy's sight and fire ; but, when it is bare and level, the art of constructing cover is of first importance. The history of all battles of late years has shown the expediency of making use of natural shelter or constructing field intrenchments. Not only is such artificial shelter necessary in action, but it is frequently invaluable for the purpose of concealing the troops before the fire has opened.

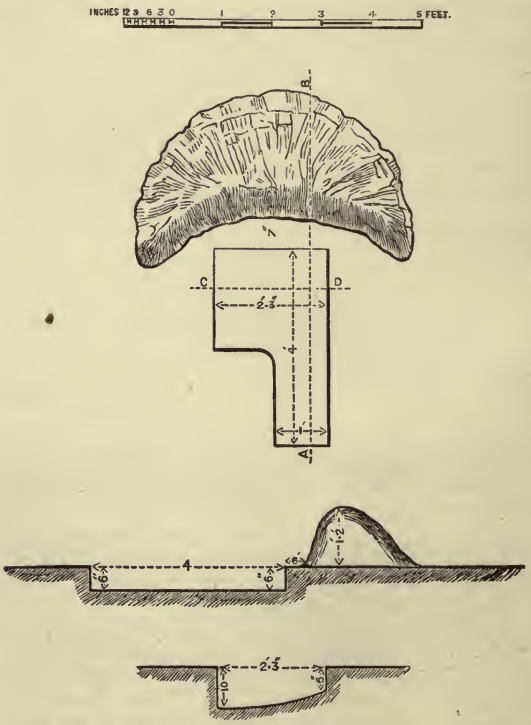


IN TRENCH. IN THE OPEN.

All soldiers, and especially recruits, should be frequently exercised in throwing up *shelter-pits* and *shelter-trenches*, on grounds of variable contours, and where there is no natural cover.

A very slight parapet of newly excavated earth is sufficient to protect men from the effects of rifle balls. Experiment shows that the penetration of the ball (service rifle) at a range of 10 yards is 20 inches, and only 10 inches at 200 yards.

After a little practice, each soldier will ascertain the form of pit that best suits and protects him. The depth need



SHELTER-PIT FOR SKIRMISHERS.

not be uniform, but should be at least ten inches where the body rests, and six inches elsewhere. With a view to lessening the effect of the enemy's fire, the soldier should lie down well under and behind the cover.

The diagram shows the dimensions of pit and parapet that seem most desirable in practice.

The soldier should never be separated from an intrenching tool of some description. Many are the instances recorded where it was impossible to forward the *intrenching tools* to the front until after the exigency for their use had passed, and the men were compelled to use tin plates, tin cans, fragments of canteens, knives, sticks, etc., in order to get temporary shelter from the enemy's most galling fire.

I am an advocate of Colonel Rice's trowel bayonet, after several practical tests of its merits. It has already been noticed on page 95. There is no doubt as to its excellence.* General Miles indorses its usefulness as follows :

I am fully satisfied that its utility and value are as well established as that of any article carried by the soldier; that it would increase the efficiency of any army ; and that it should be universally adopted by the entire army. If the opinion of officers com-

*The author's "*Combination Knife-trowel and Tent-peg*," is no improvement on Colonel Rice's bayonet, so far as the *trowel* is concerned, but it handily combines the intrenching tool and a great many other necessary articles for field equipment.

The scabbard (one edge sharp) is of the same shape and size as the blade of the trowel bayonet. A knife (rasp, saw or any other article required by the particular man who uses it), enters the scabbard and is retained in position by means of a small but strong spring. The back edge of the scabbard is prepared so as to form a convenient wrench, screw-driver, shell-extractor, etc. ; while to the upper and outer edge is attached a small neck and ring, so as to convert it into a suitable tent-peg or picket-pin, when driven into the ground. While on the march the scabbard, with knife encased, is hooked to the belt and worn at the side. For intrenching and chopping purposes, the whole is unhooked and used. To use the knife it is simply drawn from the scabbard ; and after arrival into camp, the scabbard (with or without the knife) is driven into the ground wherever needed.

Each soldier might be provided with a knife-trowel, to be worn on the body; and each cavalry-man, packer, etc., might have attached to his saddle an additional trowel, containing a rasp, saw, etc.

manding troops in the field is considered of value, I believe that opinion is decidedly in favor of its adoption.

The drawing shows the manner of forming *shelter-trenches.*

AT WORK.

Having arrived on the line (not necessarily straight, but determined by the features of the ground, so as to secure all natural cover), the men either stack or ground arms, and begin to throw the earth to the front (using both hands if necessary) so as to form a parapet from 16 to 20 inches high. All available turf, logs or rocks should be used as a revetment to the interior slope of the parapet.

The main object of these trenches is to afford cover from the fire of the enemy until the proper moment for advancing against him.

When the trench has been made 2 feet wide and 15 inches

ONE RANK KNEELING IN TRENCH, AND FILE-CLOSERS LYING DOWN IN REAR.

deep, it will afford excellent cover for one rank kneeling in it, and file-closers lying down in rear. If the trench be made 4½ feet wide, it will afford cover for two ranks kneeling inside of it; if it be 7 feet wide, it will allow the men to lie down in it.

The greatest prudence must be observed when charging Indians, as it is their favorite ruse to scatter before the pursuers, and then close again in bands and attack the rear and

flanks of the charge, well scattered while pursuing individuals. It is very seldom that they either make or meet a charge.

When they scatter it is a good plan (if the ground be suitable) to push in between their detachments, and while guarding one side, make a vigorous attack on the other.

A small command should be kept together, and never divided into detachments if it can be avoided.

The force and proximity of Indians cannot be determined by usual appearances. Frequently, when there is no visible 'sign,' the entire war party may be waiting in ambush, a few hundred yards distant; or, while many miles away, they may convey the impression that they are near and on the alert, by erecting and leaving piles of rock, etc., on the surrounding hills, which at a distance appear like sentinels.

A great deal has been said about the *superior* arms possessed by the Indians. In fact, their arms are vastly inferior to the rifle now in the hands of the infantry arm of our service, except that they are more accurately *sighted* and easily *triggered.* The skillful attainments of the Indians, however, do give them a vast superiority in using them.

Three-fourths of the regular troops, armed with breech-loaders (and especially repeating rifles) are found to possess the inexcusable fault of firing too soon.

While the fall of a few men will drive an Indian party in retreat, the harmless whizzing of bullets will only cause them to take confidence.

The Indian never fires with great rapidity, but more than makes it good by his increased accuracy of fire.

Most Indians are skilled in archery and frequently use the *bow*, when they wish to save their ammunition. The smaller Indian boys are always armed with bows and arrows. The bows are made of very tough and elastic wood, from 3 to 4 feet long, and strengthened with sinews

wrapped around them. The arrows are usually made of wild cherry, about 18 or 20 inches long, and have flint or iron points at one end and guiding crow or turkey feathers at the other.

Most Indians regard as profound secrets the modes by which the flints are broken into the desired shapes and how their arrows are poisoned.

It is an excellent maxim in Indian warfare *to do that which the Indian neither expects nor desires you to do.*

Sudden dashes into the Indian country, in the midst of hardship and suffering, are always successful.

When the grass is covered by snow, or when it loses its nutritious properties, the Indian pony becomes too weak to travel, and in consequence, the Indian is obliged to suspend all warlike operations. Then is the time to strike the blow, and the commander who is able to effect a perfect co-operation of his different columns, in spite of cold winds, rain or snow, is surely a good *Indian fighter.*

When snow is on the ground, the Indians will generally locate themselves on some point of a stream where the *cotton-wood trees* are in abundance. In the absence of better forage, their ponies subsist on the young bark of the cotton-wood ; in fact, when the bark is fresh, the stock will frequently select it in preference to hay or grain.

When hunting Indians without any 'sign' whatever, I believe it is a good plan to proceed in the direction of some locality where the cotton-wood is known to be abundant.

APPENDIX.

1. SWIMMING EXERCISES.

2. ROWING

3. CHINOOK JARGON.

SWIMMING EXERCISES.

1. Swimming, as a useful and gymnastic exercise, is worthy of the careful attention of all.

Constant practice in the different modes of using the body and limbs, will give the swimmer great confidence, and develop all the muscles. It is worthy of remark that fear alone never prevents a man swimming, but is often an obstacle to the learning.

2. The practice should usually take place in the bathing hall (and invariably when raining), but may from time to time be transferred to running waters, if practicable, when various feats in sportive swimming may be practiced.

As far as possible, the swimmer should make sure of the bottom, which is best when of gravel or small stones, and free from mud, holes, snags or weeds. When bathing in the hall, the instructor will enforce all the bathing regulations, regarding the use of apparatus, the allotment of space, etc.

3. Suitable hours (preferably in the morning before breakfast) during the months of June, July and August, will be appointed for the bathing parades. Coryza is frequently the consequence of evening bathing, when the hair is not perfectly dry before sleeping.

In all practice, when exposed to the heat of the sun, the head should be kept cool by wetting the hair, or in case of its thinness, by applying a frequently wetted handkerchief

Practice should never take place before digestion is finished, nor when the body is in a perspiration. Those of plethoric temperament should bathe at such times only as the surgeon directs.

4. The bathing costume should consist of short drawers and canvas slippers; but the sections should be occasionally re-

quired to swim in jackets and trowsers, or in the regular riding clothes.

5. On entering the water, the head should be wetted either by plunging head foremost, or by pouring water on it, in order to prevent the blood from accumulating in it, causing headache.

The learner should then advance on a clear, gradually shelving bottom, until the water reaches his breast, turn towards the place of entrance, draw in a full breath, close the lips and rest upon the water, suffering it to rise to his chin.

This is repeated, gradually immersing more and more of the head.

6. The swimmer should be taught from the first to dispense with all aids in floating—corks, bladders and lifting machines are to be avoided. When necessary, instructing as to attitude and action, the instructor may place one hand, as a support, under the learner. When the human body is immersed, one-eleventh of its weight remains above the surface in fresh water, and about one-tenth in salt water.

If the swimmer places himself upon the back and throws the head well back, so that the face is turned upwards, the water will not come over the mouth, although the face rises and sinks one inch at every inspiration and expiration.

The learner must satisfy himself as to the truth of this and learn, by practice, to confide in the power of the water to support him.

The ignorant unfortunately stretch out the arms to seize anything or nothing, and thus keep the head under the water, inasmuch as the head and arms greatly exceed one-tenth of the weight of the body.

7. After the learner has assured himself that he can float and has overcome his natural fear of the water, to become a graceful and powerful swimmer, it is only necessary for him to be drilled in the correct attitude of the body and movements of the limbs. It is proposed that these principles be taught and acquired out of the water.

Attitude.

8. No matter how perfect the learner may become in the ac-

tion, if he neglects to attain the right attitude, he will never be a good swimmer, Swimming becomes easy and delightful when the proper attention is given to the position of the head and breast and the posture of the body. The head should be thrown back, the chin elevated (lips closed), the breast set well forward, and the back hollowed and kept steady. It is important to guard against any action in the back. Many persons are addicted to raising the back when drawing in the legs, and of necessity swim with the feet too near the surface of the water.

Action of the hands and arms.

9. In the proper position of the hands, the fingers must be kept close together, the thumbs by the edge of the fore fingers, and that the fingers may properly adhere, the hands should be made a little concave on the inside. Care must be taken not to hollow the hands sufficiently to very much diminish their size; if so, they lose some of their power in the water. The hands thus formed are placed before the breast, the wrist touching it and the fingers pointing forward, preparatory to a stroke.

10. The *elevations* of the hands must be taught next. The first elevation is formed by raising the fingers higher than the thick part of the hand by 3 or 4 inches. The second by raising the outer edge of the hand (little-finger side) 2 or 3 inches higher than the inner edge. This elevation is slightly increased as the outer stroke is performed.

The first part of the stroke is made by projecting the hands forward to their utmost extent, carefully employing the *first* elevation, in order to produce buoyancy. Care must be taken in this part of the stroke that the fingers do not break the surface of the water.

11. In the outer stroke, the *second* elevation must be employed, the first elevation being avoided, and the hands allowed to decline.

In the second elevation the hands must descend until they are as low as the hips.

12. Care must be taken that the hands fall to the level of the hips at a considerable distance from them both laterally and anteriorly.

The *bearing* of the hands in the water, and their peculiar power is owing to their proper position.

The stroke being made, the hands are raised to the breast by a turn of the wrist, causing them to hang down, while the arms raise them up.

The action of the arms throughout should be gentle and easy.

These directions should be accurately reduced to practice and the learner should exercise one arm at a time, until each is accustomed to the action.

Action of the feet and legs.

13. Inasmuch as the legs are larger and stronger than the arms, the greater part of the power in swimming is derived from them. In practicing their action, one hand may rest on the top of a chair, while the opposite leg is exercised. When each arm and leg is separately accustomed to the action, the arm and leg of the same side may be exercised together.

The first action of the legs is to draw them in as high as possible, the knees inclining inward, and by a turn of the ankle, the soles of the feet inclining outward.

14. The feet are now to be thrown out to the full extent of the legs, and as widely from each other as possible.

It is evident that in drawing in the legs there was a loss of power, while in throwing them out there was a gain of power equal to that loss, and hence no advantage has been derived.

A gain of power must be sought by bringing down the legs briskly, until they come close together.

15. The legs and arms should perform their action alternately; the arms descending while the legs are rising, and *vice versa.*

Thus the body is kept in one continued progressive motion, and the action of leg and arm unceasingly interchanged. The instructor may at first allow the legs and arms to move together, and gradually proceed to the alternate movement of the limbs.

16. The proper position of the hands, their elevations and the correct modes of striking both with the arms and legs, must be practiced until performed with ease and accuracy. Strict attention must be paid to the simultaneous movements of hands and feet. For instance, remember when bringing down the left foot, to raise the left hand, by a turn of the wrist causing it to hang down, while the arm raises it.

Attitude and Action in the Water.

17. The requirements of paragraph 8 must be observed throughout when in the water. Having acquired the correct attitude, the limbs should be exercised calmly and without hurry and trepidation. A long and steady stroke sends the body well forward in the water and is not very tiresome. A learner who could swim 100 yards by long and steady strokes, and without any great fatigue, would labor hard to accomplish 25 yards by quick strokes. It is an excellent

plan, at first, to execute all the motions of the hands and feet in a steady common time.

The learner should bear in mind that it is the function of the hands to support the head above the water rather than to propel the body through it; and to get the full benefit of the stroke when the feet are kicked out in the rear, the hands, when at *full stretch* in front, should not be parted immediately, but a delay of at least one second should be allowed in order that the head may approach the point where the hands part. By thus dwelling on each stroke and keeping good time, the swimmer will advance about ten times as far each stroke, as when he parts his hands *quickly* and makes rapid strokes.

The breath should be drawn in at the moment when the body is elevated by the hands descending towards the hips, otherwise the mouth will probably become filled with water. The breath should be expired while the body is sent forward by the action of the legs. The head is the principal regulator of the movements in water; its slightest inclination to either side operates on the body, and, if not corrected, throws the body into a horizontal posture. Any disturbance of equilibrium may be restored by a cautious movement of the head alone. The use of the legs and arms for balancing the body in the water, should be frequently practiced.

Treading Water.

18. Here the position is upright, and progression is obtained by the action of the legs alone. The arms should be folded below the breast or pressed against the hips, and the legs are employed as in front swimming, except as to time and space. They should perform their action in half the usual time; because, acting perpendicularly, each stroke would otherwise raise the swimmer too much out of the water, and he would sink too low in the interval between the strokes, were they not quickly to follow each other. The space of their action should also be about two-

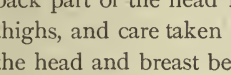
thirds of the usual space, preserving the upper (stronger) and omitting the lower part of the stroke.

There is another mode of treading water, in which the thighs are separated, and the legs slightly bent, as in a half-sittting posture; here the legs are contracted alternately, and while one remains contracted, the other, less so, describes a circle. This method of swimming is particularly adapted to relieving drowning persons.

Swimming on the Back.

19. When swimming on the back, the body should rest at full length and not assume a sitting posture. Though little calculated for progression, this is the easiest of all methods, because, much of the head and neck being immersed, there is little or no power of action required for support. The proper position is attained and preserved by lying down gently upon the water, the body extended; the head kept in a true line with it, so that the back part of the head may be immersed; the hands laid on the thighs, and care taken that the knees do not rise out of the water; the head and breast being unagitated by the action of the legs.

20. After learning to swim on the back without using the hands, the instructor should show how they (working inwards) may assist the feet in propelling the body forward. While employing the legs as in front swimming, care being taken that the knees do not rise out of the water, the arms may be used in various ways, describing large or small circles.



21. In performing what is called "winging," the arms are extended until in line with each other; they are then struck down to the thighs, with the palms turned in that direction, the thumbs inclined downward to increase the buoyancy; the palms are then moved edgeways and the arms elevated as before. The legs throughout make one stroke as the arms come down and another as they rise.

22. "Finning" differs from *winging* in making the stroke of

the arms much shorter and in the same time as the stroke of the legs. The turn of the hands is the same in both methods. The

act of passing from front to back swimming, or the reverse, must be performed immediately after throwing out the feet. To turn from the front to back, the legs are raised forward and the head thrown backward, until the body approaches an upright position. To turn from the back to breast, the legs are dropped and the body thrown forward on the breast.

23. Many advocate an upright position in both front and back swimming, because of its conformity to the accustomed move-

ment of the limbs, the freedom it gives to the hands and arms, vision all around, and a much greater facility of breathing. The speed, according to this method, is no doubt diminished, but the mode of advancing conforming so closely to what is habitual on shore, the swimmer is better enabled to effect a continued exercise of it, while husbanding the strength and rendering the power of recruiting it easy.

Floating.

24. Floating is a transition from swimming on the back. To perform it, stretch out the arms as far as possible beyond the head,

while the legs are gently exercising, being careful that they do not rise above the surface ; immerse the crown of the head rather deeply and elevate the chin above the forehead ; inflate the chest while taking this position ; cease the action of the legs and place the feet together. The hands may be crossed upon the breast, or may be placed a foot or more asunder, equi-distant from the head, to preserve an equipoise and prevent rolling over. By observing these directions, the swimmer will be able to float, rising a little with every inspiration, and falling with every expiration. Should the feet descend, the loins may be hollowed, or the hands raised a little out of the water, to counterbalance the feet, the breast being the centre of buoyancy.

Side Swimming.

25. Side swimming is well suited for passing over a short distance with rapidity. It presents to the water a smaller surface than front swimming, but is much more fatiguing. The body may be turned either upon the right or left side, and the feet perform their usual motions.

When on the left side, the swimmer should strike forward with the left hand, and sideways with the right (back to the front instead of upward). The thumb side of the hand downward serves as an oar. When swimming on either side, the lower arm stretches itself out quickly, while the feet are striking ; and the upper arm strikes while the feet are impelling, the hand beginning its stroke on a level with the head. While this hand is again brought forward and the feet contracted, the lower hand is drawn towards the breast, rather to sustain than to impel. When changing from one side to the other, both attitude and action are reversed.

Quadruped Swimming.

26. The human limbs are not formed so as to act advantageously in this method, and hence very little progress can be made. The method is very good for a change in swimming a long distance. Each hand and foot is used alternately. The hands are drawn toward the chin in a compressed form, expanded and hollowed with the fingers close together. As they strike the water the feet are drawn towards the stomach and then sent backward with a kick. The head should be set back and the breast forward.

Overhand Swimming.

27. This method is practiced by the Indians and overcomes several grave objections found in the old method, such as the exposure of a large resisting surface to the water, and the establishment of dead points, when neither of the extremities are moving. The *overhand* movement corresponds exactly with the amble of the horse.

The body is thrown more or less on its side at each stroke, and caused to twist and roll in the direction of its length, thus greatly reducing the friction experienced in forward motion. By the overhand movement, the swimmer is enabled to throw himself forward on the water, and to move his legs and arms in a plane nearly vertical (instead of horizontal), thereby increasing the length of the effective stroke, both of the legs and arms, to nearly half an ellipse. The advancing of the right and left sides of the body alternately, in a right line, contributes very much to continuity of motion. The method, although the most expeditious known, is fatiguing and can only be indulged in for short distances.

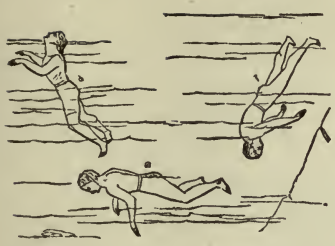
Plunging.

28. The *plunge* may be made either with the feet or the head foremost. In the leap, the legs should be kept together, and the arms close. When the plunge is made *feet foremost*, they should be kept together, and the body inclined backwards. With the head foremost, there are various methods. In the deep plunge, the swimmer has his arms outstretched, knees bent and body leant forwards until the head descends nearly to the feet, when the knees and spine are extended (Fig. 1). On rising to the surface, the mouth must not be opened before repelling the water.

In the flat plunge, made only from a small height, the swimmer should fling himself forwards in order to extend the line of the plunge as much as possible under the surface of the water. Upon touching it, he should keep his head up, back hollow, and hands stretched forward, flat and inclined upward (Fig. 2).

Diving.

29. The swimmer should prepare for diving, by taking a full and slow inspiration. The attitude for diving is the reverse of



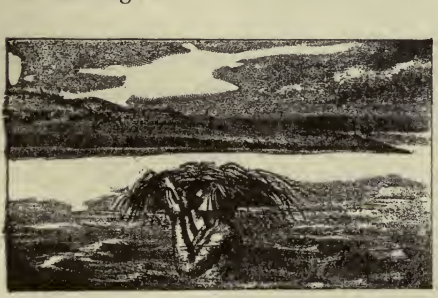
that for swimming; instead of holding back the *head*, setting forward the *breast*, etc., the head should be bent forward, so that the chin may rest upon the breast; the back should be made round, and the legs thrown out with great vigor; and the arms and hands, instead of being struck forward, must move rather backward, coming out lower, and passing more behind (Fig. 1). The eyes should be kept open, if the water is clear, to enable the diver to ascertain its depth, and observe whatever lies at the bottom.

To move forward, he must raise the head and slightly straighten the back (Fig. 2). If the diver approaches too near the surface of the water, he must press the palms upwards.

To ascend, the hands should be struck out high and brought briskly down, the chin held up and the back made concave (Fig. 3).

Feats in Swimming.

30. When the sections are well practiced in the usual modes of swimming the instructor should teach *one-arm swimming*. Here the instructor will see that the swimmers are more erect in the water and hold their heads further backwards than usual. The arm, at its full extent, must be struck out across the body and brought down before and the breast be kept inflated. This mode of swimming should be practiced to qualify for conveying anything out of the water, as well as for lending assistance in case of distress. It is readily seen how, by means of *one-arm swimming* or treading water, a person may transport his clothing



above water, or when under a blind, might sketch the position of the enemy's guns.

31. The sections should also be practiced in carrying weights while swimming.—

The practice should continue until each member may be able to readily swim with his rifle and ammunition. The drawing shows a manner of attaching the rifle by means of a spring in the crown of the helmet or hat, so that a man swimming high may transport it in a dry condition. Only expert swimmers can perform this feat.

32. Frequent practice should also take place in connection with the swimming of stock. After fairly starting the animal, the swimmer will seize him by the tail and allow him to tow him. If the animal turns his head or endeavors to change his course, the swimmer should prevent it by splashing water in his face with the right or left hand, as the case may be.

33. If the current is not very strong, it will be found much more satisfactory to swim along with the horse, on the down stream side, holding on by the halter strap, the mane or stirrup leather. It is not a good plan to remain

in the saddle, as the animal is very apt to lose his equilibrum and roll over. This is invariably the case with the ordinary mule, and moreover should a drop of water, by accident, go into his ear, his main endeavor seems to be to sink himself.

Treatment of the apparently drowned.

34. In assisting drowning persons, great care should be taken to avoid being caught hold of by them. They should be approached from behind, and should be kept distant from the swimmer by the intervention of any thing at hand, and as a last resort by means of their own hair. If possible, they should be kept on their backs, and should they attempt to seize the swimmer, must be cast loose at once.

Two swimmers treading water may assist a drowning person, by seizing him, one under each arm, and carrying him along with his limbs motionless.

The following directions for the restoration of the apparently dead from drowning, are in substance those practiced by the Royal National Life-Boat Institution.

a. Send immediately for medical assistance, blankets and dry clothing, and proceed to treat the Patient *instantly* in the open air, with the face downward, whether on shore or afloat; expose the face, neck, and chest to the air, and remove all tight clothing from the neck and chest.

The points to be aimed at are—first, the restoration of breathing; and secondly, after breathing is restored, the promotion of warmth and circulation.

The efforts to *restore breathing* must be commenced immediately and energetically, and persevered in for one or two hours, if necessary. Efforts to promote *warmth* and *circulation*, beyond removing the wet clothes and drying the skin, must not be made until the first appearance of natural breathing; for if circulation of the blood be induced before breathing has recommenced, the restoration to life will be endangered.

To Restore Breathing.

b. To Clear the Throat.—Place the patient on the floor or

ground with the face downwards, and one of the arms under the forehead, in which position all fluids will more readily escape by the mouth, and the tongue itself will fall forward, leaving the entrance into the windpipe free. Assist this operation by wiping and cleaning the mouth.

If there be only slight breathing, no breathing, or if the breathing fail, then—

To Excite Breathing.—Instantly turn the patient on the side, supporting the head, and excite the nostrils with snuff, hartshorn or smelling salts, or tickle the throat with a feather, &c., if at hand. Rub the chest and face warm, and dash cold water and hot water alternately, on them. If there be no success instantly endeavor—

To Imitate Breathing.—Replace the patient on the face, raising and supporting the chest well, on a folded coat or other article of dress.

Turn the body very gently on the side and a little beyond, and then briskly on the face, back again, repeating these measures cautiously, efficiently, and perseveringly, about 15 times in the minute, or once every four or five seconds, occasionally varying the side.

[By placing the patient on the chest, the weight of the body forces the air out; when turned on the side, this pressure is removed, and air enters the chest.]

On each occasion that the body is replaced on the face, make uniform but efficient pressure with brisk movement, on the back between and below the shoulder-blades or bones on each side, removing the pressure immediately before turning the body on the side.

During the whole of the operations let one person attend solely to the movements of the head and of the arm placed under it.

[The first measure increases the expiration—the second commences inspiration.]

The result is respiration or natural breathing;—and, if not too late, Life.

Whilst the above operations are being proceeded with, dry the

hands and feet, and as soon as dry clothing or blankets can be procured, strip the body, and cover or gradually reclothe it, but taking care not to interfere with the efforts to restore breathing. These efforts will generally prove successful in less than five minutes ; if not, proceed as follows :

c. To Immitate the Movements of Breathing.—Stand at the patient's head, grasp the arms just above the elbows, and draw the arms gently and steadily upwards above the head, and *keep them stretched* upwards for two seconds. (By this means air is drawn into the lungs.) Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest. (By this means air is pressed out of the lungs.)

Repeat these measures alternately, deliberately, and perseveringly, about fifteen times in a minute, until a spontaneous effort to respire is perceived, immediately upon which cease to imitate the movements of breathing, and proceed to induce circulation and warmth.

d. To Promote Warmth and Circulation.—Commence rubbing the limbs upwards, with firm grasping pressure and energy, using handkerchiefs, flannels, &c. [By this measure the blood is propelled along the veins towards the heart.]

The friction must be continued under the blanket or over the dry clothing.

Promote the warmth of the body by the application of hot flannels, bottles of hot water, heated bricks, &c., to the pit of the stomach, the arm-pits, and to the soles of the feet.

If the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room.

On the restoration of life, a teaspoonful of warm water should be given ; and then, if the power of swallowing has returned, small quantities of wine, warm brandy and water, or coffee should be administered. The patient should be kept in bed, and a disposition to sleep encouraged. This treatment should be persevered in for some hours until recovery is made. The following cautions are necessary :

Prevent unnecessary crowding of persons round the body, especially if in an apartment.

Avoid rough usage, and do not allow the body to remain on the back unless the tongue is secured.

Under no circumstances hold the body up by the feet.

On no account place in a warm bath, unless under medical direction, and even then it should be employed as a momentary excitant.

Treatment of the apparently dead from intense cold.

35. Rub the body with snow, ice, or cold water. Restore warmth gradually; and after some time, if necessary, employ the means recommended for the drowned. In these accidents it is very dangerous to apply heat too early.

In order to restore the natural warmth of the body, move a heated warming pan over the back and spine, and rub the body briskly with the hands.

To restore breathing, place the pipe of a common bellows (when procurable) into one nostril, carefully closing the other and the mouth; at the same time push gently downwards and backwards the upper part of the windpipe, so as to allow a freer admission of air; blow the bellows gently to inflate the lungs, until the breast be slightly raised; the mouth and nostrils should then be set free, and a moderate pressure with the hand brought to bear upon the chest. Repeat this process until life appears.

Any of the following may be useful helps:

1. The application of sal-volatile or hartshorn to the nostrils.

2. The early employment of electricity by a skillful person.

3. The injection of half a pint of warm brandy and water, or wine and water, into the stomach.

ROWING.

Nearly all the mountain streams and rivers of importance have too much depth and current to permit either poling or paddling, and the inexperienced are frequently called upon to use the sculls. An observance of the following remarks may prove useful:

THE SEAT.

The rower should sit 'amidships' on the seat of the boat, in order to prevent heeling to either side and the consequent loss of his labor. He should sit without constraint, with his legs sufficiently extended to permit a slight sinking of the knees, as he rows.

BEGINNING OF THE PULL.

At the beginning of the pull, the rower should bend his body until his head is directly over his knees, and carry his arms as far aft as possible, in order that the blades of the sculls may be thrown far forward (without jamming in the row-locks). If a long distance is to be rowed, it is less fatiguing to keep the back straight. As soon as the blades of the sculls have been carried as far forward as convenient, the rower should quickly dip them into the water and pull towards him, bending the arms and body simultaneously. Care must be taken not to dip the sculls too deep, especially in calm weather.

MIDDLE OF THE PULL.

In the middle of the pull, the blades should be covered by the water, and the position of the rower should be that represented. In pulling a pair of sculls, it is frequently difficult to keep the hands clear of each other, and the inexperienced suffer more from their knocking and rubbing against each other than from the friction of the handles of the sculls in the hands. This is generally the case when the sculls are too long, and may be obviated by the rower seating himself in the center of the thwart, with the feet close together against the center of the stretcher, and moving his body three or four inches to the right. This will throw the right shoulder slightly forward and consequently the right hand, thus permitting the hands to work clear of each other. As the right hand is generally stronger than the left it will go above.

END OF THE PULL.

The pull must be continued until the body is thrown well back, and the elbows approach the tops of the hips. Care must be taken that the hands are not brought too near the chest, as such would occasion a loss of power. There is also danger of throwing the body too far back. It should rest in such a position that it may quickly and easily return to the first position in time for the next stroke.

To feather the sculls, sink the elbows, bend the wrists upward and turn up the backs of the hands toward the fore-arms just as the sculls are delivering the water.

RETURN OF THE SCULLS.

The hands should remain turned up until the sculls are

returned to the water. Throughout the return of the sculls, the tips should be two or three inches above the surface of the water. In rough weather they should be sufficiently high to clear it. In the middle of the return, one of the hands is very likely to go higher than the other.

The head should be moveable throughout, but generally turned toward the shore when pulling against the tide or current.

TO TURN.

Back water with the scull on the side to which you wish to turn, by putting it into the water (filling towards the body) and pushing against it; and at the same time make a lively pull with the other skull, repeating it, if necessary, until the boat is properly headed.

CHINOOK JARGON.

The number of words constituting the JARGON proper does not exceed six hundred, and many of these are already obsolete or confined to certain limited localities. Not more than two hundred words of the CHINOOK language proper are used in the *jargon*, the balance coming from the Cree, Chehalis, Yakima, Klickitat and various other Indian languages.

In the *Chinook jargon*, the same word is frequently used as a noun, verb, etc., and generally has different meanings, according to the context; as, *lo-lo* (meaning whole, to earn, earnings, to carry and to conquer). Besides the words purely Indian, there are many derived from the Canadian French, and the following English words of easy pronunciation: *Comb*, *haul*, *hook*, *house*, *lazy*, *man*, *musket*, *nose*, *sail*, *salt*, *ship*, *shoes*, *shot*, *sick*, *skin*, *smoke*, *soap*, *spoon*, *stick*, *stone*, *Sunday*, *tea* and *wind*.

The following are very common expressions: *Ab-ba*, well then; *Al-ah*, expressing surprise; *Au-ah*, expressing pain; *Kweesh*, an obstinate refusal.

The *Chinook jargon* is thoroughly understood by all Indians of the Northwest, and it is believed that a study of the following vocabulary will enable any one to converse with any of the tribes. A great deal will depend upon the expression and gestures of the speaker, and experience only can teach him to intelligently say the most, while using the fewest words.

JARGON VOCABULARY.

ENGLISH—CHINOOK.

A

Above, sàh-a-le.
Absolve, mam-ook stoh.
Acorns, kàh-na-way.
Across, in-a-tì.
Afraid, kwash.
After, kim-tah.
Again (also, more), weght.
Ague, colè-sick.
Ah ! (admiration) wàh.
Ah (in pain), à-nah.
Alike, cock qua.
All, kon-away.
Al'most, wake-siàh.
Alms (to give), mam-ook kla-how-i-am.
Alone, copet-ict.
Although, kegh-ti-chìe.
Always, kwà-ne-sum.
American, Boston man.
Amusement, heè-hee.
And (then, besides, or) pee.
Angel, tà-màn-à-wis.
Angry, sollux.
Another, hul-o-ima.
Apple, le pome.
Apron, ki-see.
Arbutus, lahb.
Arm, le mah.
Arrive at, ko.
Arrow, kah-lì-tan.
As, kock-wà.
As if, kàh-kwa spose.
Ascend, clàt-à-wà sah-a-le.
Ash Tree, is-ick-stick.
Ask (to), wà-wà.
At, kò-pa.
Aunt, kwalh.
Autumn, ten-as cole illà-he.
Awl, shoes keep-wot.
Axe, la hash.

B

Back, kimp-tà.
Bad, me-sà-chie.
Bad odor, humm.
Bad Spirit, mà-sà-chi tamàn-à-wis.
Bag, le-sàk.
Ball, col-li-ton.
Bargain, ma-kook.
Bark, stick-skin.
Barrel, ta-mo-litsh.
Basket, ò-pe-kwan.
Be still, cul-tas mit-lite.
Beads, kà-mò-suck.
Bear (to), chet-woot.
Bear, its-hoot.
Beard, cha-pootch-us.
Beat (to), kok-shet.
Beaver, ee-naa.
Because, keh-wa.
Become (to), cha-ko
Before, e-lip.
Behind, kim-ta.
Bell, tin-tin.
Belly, ya-kwah-tin.
Below, keè-kwil-lie.
Belt, là san-jel.

Berries, o-lil-lie.
Best, e-lip klosh.
Beyond, ten-às si-ah.
Big, hy-as.
Bird, kal-lak-a-la.
Biscuit, la bis-ke.
Bitter, klihl.
Black, klale.
Blackberries, klik-a-muks.
Blanket, pa-see-sie.
Blind, ha-lo see-à-host.
Blood, pil-pil.
Blow, puk-puk.
Blow out, mam-ook-poh.
Blue (light shade), spò-oh.
Blue (dark shade), klale.
Blunder (to), tsee-pie.
Board, la plash.
Bob-tailed, sis-ki-you.
Boil (to), lip-lip.
Bone, stone.
Boots, stick shoes.
Bore a hole (to), mam-ook thlà whop.
Borrow (to), a-yah-whul.
Both, kon-a-moxt.
Bottle, la-boo-ti.
Bow (of a boat), nose.
Bow (to shoot with), stick musket.
Bow, o-pitl-kegh.
Bowl, oos-kan.
Box, la ca-sett.
Boy, ten-as man.
Bracelet, klik-wal-lie.
Brass, pel chick-a-min.
Brave, skoò-kum tum-tum.
Bread, pia sa-pa-lil (san-delià).
Break, kok-shet.
Breast, to-toosh'.
Bridle, la bleed.
Bright, te-wagh.
Bring (to), màm-ook chà-co.
Broad, kluk-ulh'.
Broken, cha-cluck.
Brother, kàp-ho, if older than the speaker; ow, if younger.
Brother-in-law, ek-keh.
Brook, ten-às chuck.
Broom, bloom.
Bucket, ta-mò-litsh.
Buffalo, moos-moos.
Bullet, le bal, or ke-li-li-tan.
Bundle, kow.
Burn (to), mam-ook pia.
Biscuit, la-bisque.
But, pee.
Butter, to-toosh-la-klees'.
Button, chil-chil.
Buttons, tsil-tsıl.
Buy (to), mah-kook.
By, co-pa.
By-and-By, win-a-pie.

C

Cabbage, cabbage.
Call (to), wà wà.
Calf, ten-as moos-moos.
Calm (a), ha-lo wind.
Candle, la shan-del.
Canoe, ca-nım.
Cap, se-ah-pult.
Capsize, kil-à-pie.
Carrot, la-ca-lat.
Carry (to), lo-lo.
Cart, tsik-a-tsik.
Cascade, tum-wa-ter.
Cask, ta-mo-litch.
Cat, puss-puss.

Cataract, tum wa-ter.
Cattle, moos-moos.
Cedar, là med-cìne stick.
Cellar, ket-wil-là.
Certainly, na-wit-kà.
Chain, chick-à-min lope.
Chair, la shase.
Change (to), huy-huy.
Cheat (to), là-lah.
Chicken, la pool.
Chief, ty-eè.
Child, ten-as man.
Chilly, ten-as cole.
Chimney, la-shum-ma-na.
Circle, que-u-que-u.
Clams, ò-na (emet-oks).
Clear, klah.
Clock, hy-as watch.
Cloth, sail.
Cloth (dark), its-hoot
Clouds, smoek.
Coat, ca-po.
Coffee, kau-py.
Cold, cole.
Color, 'tsum.
Come on, hy-ak.
Come (to), chà-co.
Come here, chà-co yockwa (ne-whàh).
Command (to), wà-wà.
Conceal, ipsoot.
Conjuring, ta-ma-na-wis.
Conquer (to), lo-lo.
Cook, mam-ook muck-a-muck.
Cool (to), mam-ook cole.
Copper, pil chick-à-min.
Cord, ten-às lo-pe.
Corn, ye-salth.
Corral, kul-lagh.
Cotton goods, sail.
Cough, hoh-hoh.
Count (to), mam-ook kwun-nun.
Cow, clooch-man, moos-moos.
Country, il-la-hè.
Coyote, tal-a-pus.
Crab-apple, pow-itsh.
Cranberry, so-le-mie.
Crazy, pelton.
Cream-colored, la clem.
Crooked, ky-wà.
Cross, là clo-a.
Crow, càw-càw.
Cry (to), cly.
Cup, oos-kan.
Curly, hunl-kih.
Cut (to), tl-ko-pe.

D

Dance, tanse.
Dark, polàk-lie.
Daughter, ni-ka ten-as clooch-man.
Day (this), o-kook sun.
Daybreak, ten-as sun.
Dead, mem-à-loos.
Deaf, ik-pooie kwil-lan.
Dear, hy-as mà-kook.
Deep, klip.
Deer, mow-itsh.
Demon, skoo-kum.
Desert (to sneak off), swal-là clat-à-wà càp.
Devil, deaub.
Different, kull.
Dig (to), mam-ook il-l.
Dime, bit.
Dirty, pot-tle il-la-he.
Dish, os-cun (plural la plà).

Dive (in water), clàt-a-wà keg-willy chuck.
Do (to), mam-ook.
Doctor, doc-tin.
Dogs, kam-ooks.
Dollar, dol-la.
Door, la pò-te.
Down stream, mi-mie.
Drink, mam-ook chuck.
Drive (to), kish-kish.
Drunk, pot-tle lum.
Dry, sun, (dly).
Duck, kul-lak-a-la.
Duck (Mallard), hàht-huht.
Dust, po-lal-lie.

E

Eagle, chak chak.
Ear, kwo-lann
Early, ten-as sun.
Earn, lo-lo.
Earth, il-la-he.
Eat (to), muck-a-muck.
Egg, la sap.
Elk, moo-luck.
Embrace, ba-ba.
Empty, ha-lo mit-lite.
Enclosure, kul-làgh.
End, o-boot.
Enemies, me-sa-chie til-la-cums.
Englishman, King Gawge man.
Enlarge, hy-as mam-ook.
Enough, hy-u, or co-pet.
Entrails, ki-yah.
Evening, ten-as polak-lie.
Every, kon-a-wà.
Exchange, huy-huy.
Extinguish, mam-ook mem-a-loos, (poh).
Eyes, see-a-host.

F

Face, see-a-host.
Fade (to), cha-co spo-ak.
Faded, spo-oh.
Falsehood, klim in-a-whit.
Falsify (to), cla-man-a-whit.
Far, si-ah.
Far off, sy-àh.
Fast (quick), hy-ak.
Fast (tight), kwutl.
Fasten (to), kow.
Fat, glease.
Fat (to), hy-às gleece.
Father, pa-pa.
Fathom, it-lan (eth-low).
Fear, kwass.
Feet, là pe-à.
Fell (to), mam-ook-whim.
Fence, kul-lagh.
Fetch, mam-ook cha-ko.
Fever, waum sick.
Few, ten-as.
Field, klosh il-la-he.
Fight (to), mam-ook sol-lux.
Fight (with fists), mam-ook puk-puk.
Figured, tzum.
File, la-leem.
Fill (to), mam-ook pahtl.
Find (to), klap.
Finished, co-pet.
Fingers, le doo.
Fire, pi-a.
First, e-lip.
Fish, pish (sa-mon).

Fish-hook, ik-kik.
Flag, Sun-day.
Flea, en-e-poo.
Flesh, il-wil-lie.
Flies, le moose.
Flint, kil-it sut.
Flour, sap-o-lil.
Flowers, klosh tip-so.
Fly (to), ka-wak.
Fog, smoke.
Food, muck-a-muck.
Foot, le-pee.
For what, pe-co-tu.
Forever, kwah-ne-sum.
Forenoon, èlip sit-cum sun.
Forget, copet cum-tux (mah-lie).
Fork, la poo-shet.
Formerly, an-kot-tie.
Fox, tà-la-pos.
Frenchman, pa-si-ooks
Friend, six.
Frog, swàh-kuk.
Fry (to), mam-ook la po-el.
Frying-pan, là po-el.
Full, pahtl.

G

Gallop (to), kwa-lal kwa-lal.
Gamble (to), ith-el-coom.
Gather (to), ko-ku-mulh.
Get (to), is-kum.
Get out, mash.
Get up, ket-op.
Ghost, skoo-kum.
Gift, cultus pot-lotch.
Girl, ten-as clooch-man.
Give (to), pot-latch.
Glad, kwàrm.
Glass, she-lockum.
Go, clat-a-wà.
Go to bed, clat-a-wà moo-sum.
God, sa-hà-lie ty-ee.
Gold, pil chick-a-min.
Good, klosh.
Good-bye, klà-how-i-am.
Goods, ic-tas.
Goose, kàl-àk-à-làh.
Grandfather, chope.
Grandmother, chitz.
Grass, tip-so.
Grease, gleese.
Great, hy-as.
Great many, hy-u.
Green, pe-chugh.
Grey, le-gley.
Grizzly bear, se-àm.
Ground, il-la-he.
Gum-wood, là goom-stick.
Gun, suk-wal-lal.

H

Hail, cole-snass.
Hair, yak-so.
Half, sit-cum.
Hallo, nah.
Hammer, le-mah-to.
Hand, le-mah.
Hand (game of), it'lo-cum.
Handkerchief, kak-at-chum
Handsome, hy-as klosh.
Hard, kull.
Hare, kwit-shad-ie.
Harrow (to), mam-ook comb il-la-he.
Hat, se-ah-po.

Hazel nuts, tuk-wil-la.
He (she, it, his, etc.), yak-ka.
Head, la tet.
Heart, tum-tum.
Heaven, sà-hà-lie il-là-he.
Heavy, till.
Help (to), mam-ook e-lan.
Hell, ket wìt-là pià-hy-as
Hen, la pool.
Here, yock-wa.
Hide, skin.
Hide (to), ip-soot.
High, sà-hà-lie.
Hit (to), kwulh.

Hoe, là-pe osh.
Hog, co-sho.
Hole, kla-whop.
Holiday, Sunday.
Horn, stone.
Horse, cu-i-tan.
How, kàh-tah.
How large? kon-si-ah.
How many? kon-se-à.
Hundred, tuk-a-mo-nuk.
Hungry, o-lo.
Hurry, hy-àk.
Husband, man.

I

I (me, my or mine), ni-kà.
Ice, cole chuck.
If (suppose), spose.
In, ko-pà.
Indian, si-wash.

Indian corn, e-salth.
In shore, maht-wil-lie.
Iron, chick-a-min.
Island, ten-às il-la-he.
It (this, that), o-cook.

J

Jealous, sick tum-tum.
Joke (to), mam-ook làh-làh.

Joy, u-a-tle.
Jump (to), sò-pe-na.

K

Kamass root, là kà-mas.
Keep off (to), maht-lin-nie.
Kettle, ket-ling.
Key, la kley.
Kick (to), chuck-kin.
Kill (to), mam-ook mim-a-loos.

Kiss, be-be.
Knife, ò-pit-sah.
Knock (to), kò-kò.
Knotty, hunl-kih.
Know (to), cum-tux.
Know (not to), wake cum-tux.

L

Lad, ten-as man.
Lame, klook te-hà wit.
Lamprey eel, skwàk-wàl.
Land, il-la-hè.
Land otter, in-a-mooks.
Language, là làng.
Large, hyas.

Last (hindermost), kimpta.
Lately, ten-às an-cot-tà.
Laughter, hee-hee.
Leap (to), sò-pe-na.
Leaf, tip so.
Lean (to), lagh.
Leave (to), mahsh.

Leave off (to), ko-pet.
Leg, te-ah-wit.
Leggings, mi-tas (sa-kol-eks).
Lend (to), a-yah-whul.
Length, youtl-kut.
Lick (to), kla-wun.
Lie (to), kla-man-a-wit.
Lift (to), mam-ook sa-ha-le.
Light (not heavy), wake-till.
Light (daylight), sun or twà, (not dark), na wà.
Lightning, sa-ha-le pi-à.
Like, ka-kwa.
Like (to), tik-egh.
Listen (to), ne-whà.
Little, ten-as.
Live (to), mit-lite.
Liquor, lum.
Long while ago, là-lee.
Long, youtl-kut.
Long ago, an-cot-tie.
Look, nan-itch.
Looking glass, she lockum.
Loose, stoh.
Lose the way (to), tso-lo.
Lost, mash.
Love (to), tick-egh.
Lower, mam-ook-keg-wil-le.

M

Mad, sol-lux.
Magic, tà mà-nà-wàs.
Make (to), mam-ook.
Many, hy-u.
Mark, tsum.
Mark (to), mam-ook tsum.
Marry (to), ma-li-egh.
Mass (ceremony of) la mess.
Mast, ship stick.
Mat, klis-kwis.
Mattock, la peosh.
Measure (to), ta nim.
Meat, itl-wil-lie.
Medicine, là med-sin.
Men, til-li-cums.
Mend (to), mam-ook tip-shin.
Metal, chick-à-min.
Middle (the), kat-sik.
Mid-day, sitcum sun.
Midnight, sit-cum pol-àk-lie.
Milk, to-toosh.
Mill, moo-la.
Mind (the), tum-tum.
Mire, weght.
Miss (to), seè-pie.
Mixed, tzum.
Moccasins, skin-shoes.
Molasses, me-las.
Money, chick-a-min.
Month, moon.
Mosquito, mel-a-ĸwa.
Mother, ma-mà.
Mountain, la monti.
Mountain, hy-as il-la-he.
Mouse, hool-hool.
Mouth, la boss.
Much, hy-u.
Mud, cle-min il-la-he.
Mule, la mel.
Music, tin-tin.
Mussels, to-luks.
Muskrat, cul-tus e-nah.
My (mine), nì-ka.

N

Nails, le clou.
Name, yah-hul, (nem).

Near, wake si-ah.
Neck, le cou.
Needle, ca-pu-ut.
New, chee.
Never, wake con-sè-àh.
Night, po-lak-lie.
No (not), wake.
Nobody, wake clax-to.
Noise, là tlah.
None, ha-lo.
Nonsense, cul-tus wa-wa.
Noon, sit-cum sun.
Not yet, wake al-ta.
Nothing, wake ic-ta.
Notwithstanding, kegh-tchie.
Now, al-ta.
Nuts, til-wil-la.

O

Oak, kull stick.
Oar, la lahm.
Oats, la wen.
Obtain, is-kum.
Ocean, salt-chuck.
Off, klak.
Off shore, mahtl-in-nìe.
Oil, gleece (la-kles).
Old man, ole-man.
Old woman, lam-mi-eh.
On, co-pa.
One eyed, ict see-a-host.
Only, co-pet, ok-kook.
Open, hah-lakl.
Open (to), he-luck.
Opposite, in-a-ti.
Or, pe.
Order (to), mash tum-tum.
Other, hul-o-i-ma.
Otter, e-mam-ooks.
Our (we, us), ne-si-ka.
Out doors (outside), klagh-a-nie.
Over (above), sah-hà-lè.
Over (other side), en-a-ti.
Overcoat, ka po.
Ox, moos-moos.
Oysters, chet-lo.

P

Paddle, is-ick.
Paddle (to), mam-ook is-ick.
Paint, pent.
Paint (to), mam-ook pent.
Pants, se-ca-luk.
Path, o-e-hut.
Paper, pè-pah.
Peas, le pwan.
People, til-li cums.
Perhaps, klo-nas.
Petticoat, kal-a-kwah-tie.
Piebald, le kye.
Pin, kwek-wi-eus (keep-wot).
Pipe, la peep.
Pitch, la goom.
Plate, la se-et.
Pleased, youtl.
Plough (to), klugh il-la-he.
Pole, le pehsh.
Poor, ha-lo ic-ta (kla-how-yam).
Pork, co-sho.
Porpoise, qui-see-o.
Potato, wap-pa-to.
Pour (to), wagh.
Powder, po-lal-lie.
Prairie wolf, tul-a-pus.
Present (a), cul-tus pot-latch.
Presently, al-kie (win-a-pie).
Pretty, to-ke-ti.

Priest, le plet.
Proud, youtl (kwelth).
Provided that, spose.
Pull, haul.
Push, Kwult.

Q

Quarter, ten-as sit-cum.
Quarter (of a dollar), kwah-ta.
Quick, hy-ak.
Quills, te-peh.

R

Rabbit, kwit-shad-ie.
Rain, snass.
Rat, holé holé.
Rattle, shugh.
Rattlesnake, shugh-ò-poots.
Razor fish, ò-na.
Reach, ko.
Red, pil.
Relate (to), yi-em.
Report (of a gun), poo.
Return, cha-co kil a-pie.
Ribbon, le lo-ba.
Rice, mit-whit.
Rifle, ca-li-peen.
Ring (a), kwèo-kwèo.
Ripe, pi-ah.
River, hy-as chuck.
Road, way-hut (o-chut).
Roan-colored, san-de-lie.
Roast, mam-ook la pellah.
Rock, stone.
Rooster, la cock.
Root, ka-mass.
Rope, lope.
Rotten, poo-lie.
Round, lo-lo.
Row (to), mam-ook le-lam.
Rudder, boat-o-poots.
Rum, lum.
Run, coo-ry.
Run away, cap-swal-la clat-a-wa.

S

Sack, le sak.
Saddle, la sell.
Saddle-housing, le-pish-e-mo.
Sailor, ship-man.
Salmon, sà-mon.
Sand, po-lal-lie.
Sandwich Islander, Oyee.
Sash, la saw-jel.
Saw, la see (la gwin).
Say (to), wa-wa.
Scarce, quass.
Scissors, le see-zo.
Sea, salt chuck.
Seal, ol-hi-yu si-wash co-sho (ol-hy-in).
See (to), nan-itch.
Sell (to), mah-cook.
Send (to), clat-a-wà.
Sew (to), mam-ook tip-shin.
Shake, hul-hul.
Shake (to), to-to.
Shame, shem.
Sharp, pah-kis-ilth.
Sharpen (to), mam-ook tsish.
She, ya-ka.
Sheep, le moo-to.
Shell money (small), coop-coop.
Shell money (large) ai-qua.
Shingle, le bah-do.

Shining, to-wagh.
Shirt, shut.
Shoot (to), mam-ook poo.
Short, yutes-kut.
Shot-pouch, ki-li-tan le-sac.
Shout (to), hy-as wa-wa.
Shovel, la-pell.
Shut (to), ik-poo-ie.
Sift (to), to-to.
Silk, la-sway.
Silver, t-kope chik-a-min.
Similar, kah-kwa.
Since, kim ta.
Sing (to), shan-ti.
Sink, cli-a.
Sister (elder), lik-po.
Sister (younger), ats.
Sit (to), mit-lite.
Skunk, hum-o-poots (saub-boo).
Sky, koo-sah.
Slave, e-li-te (mist-chi-mas).
Sleep, moo-sum.
Slowly, kla-wa.
Small, ten-as.
Smell, hum.
Snake, o-luk.
Snare, la pe-age.
Snow, cole-snass.
Soft, cla-mìn.
Sometimes, ict-ict.
Soon, wake le-ly.
Sorrell (color), le-blau.
Sorry, sick tum-tum.
Sour, kwates.
Spade, la pell.
Speak (to), wà-wà.
Spill (to), wagh.
Spirit (guardian), to man-no-us.
Spirits, lum.
Split, tsugh.
Split (to), mam-ook tsugh.
Spectacles, dal-la see-a-host.
Spit (to), mam-ook toh.
Spotted, le-kye.
Spurs, la see-blo.
Squirrel, kwis-kwis.
Stab (to), klem-a-hum.
Stag, man-mow-a-itch.
Stand, mit-whit.
Stars (buttons), tsil-tsil.
Stay (to), mit-lite.
Steal, cap-swalla.
Steam, smoke.
Steamer, ship (pia-ship).
Stirrup, sit-lay.
Stockings, kush-is.
Stop, ko-pet.
Store, ma-cook house.
Story, eh-kah-nam.
Straight, si-pah (de-làte).
Strawberries, a-mo te.
Strike (to), cock-shet.
Strong, skoo-kum.
Sturgeon, stutch-un.
Subdue, quan.
Sugar, le sook.
Summer, waum il-la-he.
Sun, Otà-lagh.
Sunset, elip-sun.
Suppose, spose.
Swan, kah-loke.
Sweep (to), mam-ook bloom.
Sweet, tsee.
Swim, sit-shum.

T

Table, la tahb.
Tail, o-poots.
Take (to), is-kum.
Take care, klosh nan-itch.

Take off, mam-ook klak.
Tale, yi-em.
Talk, wà-wà.
Tame, kwass.
Tattle (to), ya-yim.
Teach (to), mam-ook-cum-tux.
Tear (to), klugh.
Teeth, le tah.
Tell (to), wà-wà.
Thank you, màh-sie.
That, o-cook.
That way (there, beyond), yah-wa.
They, klas-ka.
Thick, pit-lilh.
Thin, pe-what-tie.
Thing, ic-ta.
Thirsty, o-lo chuck.
This, o-cook.
This way, yàk-wà.
Thou (thy, thine), mi-kà.
Thread, kla-pite.
Throw (to), mash.
Throw away, mahsh.
Tide, chuck.
Tie (to), kow.
Tight, kwutl.
Tinware, ma-lah.
Tip (to), lagh.
Tired, till.
To (towards), ko-pa.
Tobacco, ki-noos.
To-day, o-cook sun.
To-morrow, to mà-là.
Tongue, la lang.
Trade (to) hoè-hoè.
Trail, way-hut.
Trap, la piege.
Tree, stick.
Tree (fallen), whim stick.
Tremble, hul-hul.
Trot (to), teh-teh.
Trouble, mam-ook till.
Trowsers, so-kol-eks.
True, de-làte.
Truth, de-làte wà-wà.
Tub, ta-mò-litsh.
Turn (to), howh.
Turn over (to), kil-à-pie.
Twice, moxt.
Twilight, twàh.
Twine, ten-as lope.

U

Uncle, tot.
Under, kee-kwil-lie.
Understand (to), cum-tux.
Unhappy, sick tum-tum.
United States, Boston il-la-he.
Untamed, le mo-lo.
Untie (to), mam-ook stoh.
Up (above, heavenward) sa-ha-lie.
Upset (to), kil-a-pi.
Us, ne-si-ka.
Useless, cul-tus.

V

Vancouver, kits-oat-qua.
Venison, mow-itch.
Very, hyas.
Very small, hy-as ten-as.
Vessel, ship.
Vest, la west.
Vomit (to), wagh.

W

Wagon, chik-chik.
Wander (to), ts-o-lo.
Warm, waum.
Wash (to), mam-ook wash.
Watch, tik-tik.
Watch (to), nàn-itch.
Water, chuck.
Waterfall, tum-water.
We, ne si-ka.
Week (one), ict Sunday.
Weigh (to), mam-ook til.
Wet, pahtl-chuck
Whale, eh-ko-lie.
What, ic-ta.
What color? kà-tà tsum.
Wheat, sap-o-lil.
Wheel, chik-chik.
When, kan-sih.
Where, kah.
Whip, la whet.
White, t-kope.
Who, klax-ta.
Whole, lo-lo, kwa-nice.
Why, kah-tah.
Wicked, me-sa-chie.
Wide, kluk-ulh.
Wild, le mo-lo.
Will (the), tum-tum.
Willow, ee-na stick.
Win (to), to-lo.
Winter, cole il-la-he.
Wipe (to), klak-wun.
Wire, chik-a-min lope.
Wire (brass), klik-wal-la.
Wish (to), tick-ey.
With, co-pa.
Without, ha-lo.
Wolf, le-loo.
Woman, clootch-man.
Woman, (old) lam-mi-eh.
Wood, stick.
Work (to), mam-ook.
Worn out, ol-è-man.
Worthless, cul-tus.
Wound (to), klem-a-hum.
Write (to), mam-ook tsum.
Writing, tsum.

Y

Year (a), ict cole.
Yellow, kaw-ka-wak.
Yes, ah-ha.
Yes indeed, na-wit-ka.
Yesterday, tahl-kie sun.
Young, ten-as.
You, mi-ka.
Yours, me-sika.

NUMERALS.

One, ict.
Two, moxt.
Three, klone.
Four, lak-it.
Five, kuin-num.
Six, tagh-hum.
Seven, sin-à-moxt.
Eight, sto-te-kin.

Nine, kweest,
Ten, tah-tel-lum.
Twenty, moxt tah-tel-lum.*
Thirty, klone tah-tel-lum.
One hundred, ict ta-kà-mo-nuk.
One thousand, tah-tel-lum ta-ka-mo-nuk.

EXAMPLES OF CHINOOK CONSTRUCTION.

Good morning (Good-evening ! Good-day ! How are you, etc.) ! friend ?—Kla-how-iam, six ?

Are you sick ?—Sick, nah mi-kà ?

A severe ague.—Hy-as colè-sick.

Are you thirsty ?—Nah ? ol-o chuck mi-ka ?

Yes, indeed !—Na-wit-ka !

Here is something to eat.—Yock-wa mit-lite mi-ka muck-a-muck.

Thank you ! Bring me some water.—Màh-sie. Clat-a wà is-cum chuck.

In what ?—Ko-pà kah ?

In that bucket.—Ko-pà o-cook ta-mò-litsh.

Are you able to carry it ?—Nah skoo-kum mi-kà lo-lo o-cook.

No ; it is too heavy.—Wake. Hyas til o-cook.

Where is the bottle ?—Kah la-boo-ti ?

I don't know. No ; there it is.—Wake cum-tux. Wake, yà-wa.

Come here, boy ?—Chà-co yock-wa ten-as man.

What do you want ?—Ic-ta mi-ka tick-ey ?

Carry this man to the river.—Lo-lo o-cook man ko-pà hy-as chuck.

Is he tired ?—Til nah yak-ka ?

Will you work for me ?—Mi-ka nah tickey mam ook ten-as icta ?

At what ?—Icta ?

*Greater numbers are expressed by a conjunction of the words expressing the numbers to be added, thus : Sin-a-moxt tah-tel-lum (seven times ten) express seventy.

Come to-morrow, and carry this box to the steamboat.—
Chàco to-mà-la, pee lo-lo o-cook la-cà-sett ko-pà pia-ship.
What will you give me ?—Ic-ta mi-ka pot-latch ?
One quarter, or two bits.—Ict quarter, pe moxt bit.
No ; give half a dollar.—Wake ; pot-latch sit-cum dol-la.
Very well, I'll give you half a dollar.—Close ca-quà, ni-ka pot-latch sit-cum dolla.
To which steamboat ?—Clax-ta.
That large one ?—O-cook hy-as pia-ship ?
How far ?—Kou-se-a si-ah ?
Not very far (a short distance).—Wake si-ah.
Make a fire, boil the water, and wash the dishes to-day.—Mam-ook pi-a, mam-ook lip-lip chuck, wash o'cook la-plà o-cook sun.

THE LORD'S PRAYER IN JARGON.

Our father who stayeth in the above, good in ou
Ne-si-ka Papa klax-ta mit-lite ko-pa sà-ha-lie, klosh ko-pa ne
hearts (be) thy name ; good thou chief among al
si-ka tum-tum mi-ka nem ; klosh mi-ka ty-ee ko-pa kon-a-wa
people ; good thy will on earth as in the
til-li-cum ; klosh mi-ka tum-tum ko-pa il-la-he kah-kwa ko-p
above ; give every day our food ; If we
sa-ha-lie; pot-latch kon-a-way sun ne-si-ka muck-a-muck ; Spos
do ill, (be) not thou very angry, and if anyone evi
ne-si-ka mam-ook me-sà-chie wake mi-ka hy-as sollux, pee spos
towards us, not we angry towards them ; send
klax-ta me-sà-chie ko-pa ne-si-ka, wake ne-si-ka sollux ko-p
away far from us all evil.
klaxta ; mahsh si-ah ko-pa ne-si-ka kon-a-way me-sà-chie.

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WASHINGTON, D. C.

It gives me great pleasure to accede to your request for a few words respecting the behavior of the "Fox Gun," which I used during a season in Arizona. It is proper to state that no severer test could be given a gun than the service it necessarily undergoes in the rough campaign life of a Government exploring party. It must not only stand exposure to the vicissitudes of the weather, especially the prolonged wet season, but when in use on the dry plains, where the air is often filled with flying sand, it is next to impossible to prevent the gritty particles from lodging between the barrels and the stock. This, as every sportsman knows, is a fruitful source of annoyance, and often of positive injury to the weapon. During the season, at a low estimate, not less than fifteen hundred shots were fired. Again, as all travelling was performed on horseback, the gun was constantly carried in a sling before the saddle ; this alone being no light trial, and one particularly liable to render the gun shaky. And now, at the end of its six month's service, I can say that the gun is practically in as good condition as when taken from the shop ; a statement to be appreciated when it is understood that three other breech-loaders, from makers of first-class reputation, with less service, were either partially or wholly disabled ere leaving the field.

H. W. HENSHAW, *of Wheeler's U.S. Exploring Expedition.*

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